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Revision of Indian species of the Families Platycnemididae and Coenagrionidae (Insecta : Odonata : Zygoptera) Taxonomy and Zoogeography

TRIDIB RANJAN MITRA AND R. BABU

ZOOLOGICAL SURVEY OF INDIA

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REVISION OF INDIAN SPECIES OF THE FAMILIES PLATYCNEMIDIDAE AND COENAGRIONIDAE (INSECTA : ODONATA : ZYGOPTERA)

(Taxonomy and Zoogeography)

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CONTENTS

INTRODUCTION

Families Coenagrionidae and Platycnemididae are in the superfamily Coenagrionoidea along with families Platystictidae and Protoneuridae. Fraser (1933 b) named them in subfamilies Coenagriinae and Platycneminae; he put them under the family Coenagriidae along with Synlestinae, Lestinae, Megapodagriinae, Platystictinae and Protoneurinae. Fraser (1957) in his 'Reclassification' cited them as families. Moreover, with the aid of five dominant ordinal characters, *viz.*, Anal crossing, presence of primary antenodals, presence of zygopterous ovipositor, positions of IR_3 and IR_4 in relation to the node and separation of eyes, he hypothesized Coenagrionidae descended from Platycnemididae in the direct line from Protozygoptera; and Platycnemididae from Protoneuridae.

During the period from 1933 to 2006 several new taxa have been reported and some new combinations have been considered, in addition to new records on geographical distribution of species. In certain recent literature confusions on certain taxa have not been solved. Hence a review of the works is necessary. In the present work detailed geographical distribution of each species, remarks on some recently described new taxa and new combination have been given on the basis of Fraser's (1957) contention that species should be built on difference and genera on relationship. On the basis of literature, the distribution of *Enallagma risi* Schmidt and *Pyrrosoma elisabethae* Schmidt have been discussed.

MATERIALS AND METHOD

Adult specimens were obtained from collections of Zoological Survey of India, mainly from Head Quarter in Kolkata. Specimens were examined under the dissecting binoculars. Specimens of some species could not be examined; hence comments on those species have been reserved. Specimens of some species, present in Old collections of Zoological Survey of India, Kolkata, were collected from the localities, erstwhile in North-West India, now in Pakistan have been included in the study. Distribution of genera has been obtained from Dr. S. Tsuda's *A distributional list of World Odonata*, 2000; diagnostic characters of genus have been taken from the *Fauna of British India, Vol.1.* (*Odonata*) and other literatures.

Species have been studied as per traditional and conventional methods of identification on the basis of available description, since type specimens are not available now a days and as per articles and recommendation of the International Commission of Zoological Nomenclature being published from time to time in its bulletin and zoological literature.

Superfamily and families only have been considered, other taxa, *viz.*, tribe, subfamilies have not been dealt with. Keys have been prepared on the basis of specimens studied; specimens recorded from literature have not been included in the keys; except *Calicnemia carminea pyrrhosoma* Lieftinck. Names (changed in recent times) of localities have been cited by Mitra (2002 b), hence not repeated here. In reporting geographical distribution, authorities have also been cited; specimens from those localities could not be examined in many cases. Details of collection localities and names of collectors have been cited in Chottani *et al.* (1983), Lahiri (1977-1987), Mitra (1988-2006) for Indian specimens. Pakistan's specimens were collected by B. Prasad, B.N. Chopra, S.L. Hora and H.S. Pruthi.

CONSPECTUS OF HISTORICAL RECORDS

Fraser (1933 b) reported 81 (Eighty one) species and subspecies of the subfamilies – Platycneminae and Coenagriinae. Subfamilies have been raised to family level later on.

The present review is based on literature published after the *Fauna of British India, Odonata* (Volume- 1) by Fraser (1933 b). The very important literature dealt with taxonomy and related discipline after Fraser's "*Fauna*" are as follows: Asahina (1967, 1984, 1985, 1991), Davies (1981), Davies and Tobin (1984), Fraser (1933 b, 1949, 1957), Hämäläinen (1989 a, b), Kiauta (1974, 1975), Kiauta and Kiauta (1982 a, b; 1983 a, b), Kimmins (1966), Kumar and Prasad (1978, 1981), Lahiri (1987 and 2002), Lieftinck (1954, 1984), Mitra (1975 a, b; 1983, 1992, 1995 a, b, c; 1999, 2000, 2002 a, b; 2003 a, 2005), Mitra and Lahiri (1980), Papazian *et al.* (2007), Peters (1981), Pinhey (1964, 1974 a, b), Prasad and Varshney (1995), Tsuada (1991, 2000), Vick (1986 and 1989), Weekers and Dumont (2004).

ABBREVIATIONS AND GLOSSARY OF SCIENTIFIC TERMS USED

(A) Abbreviations

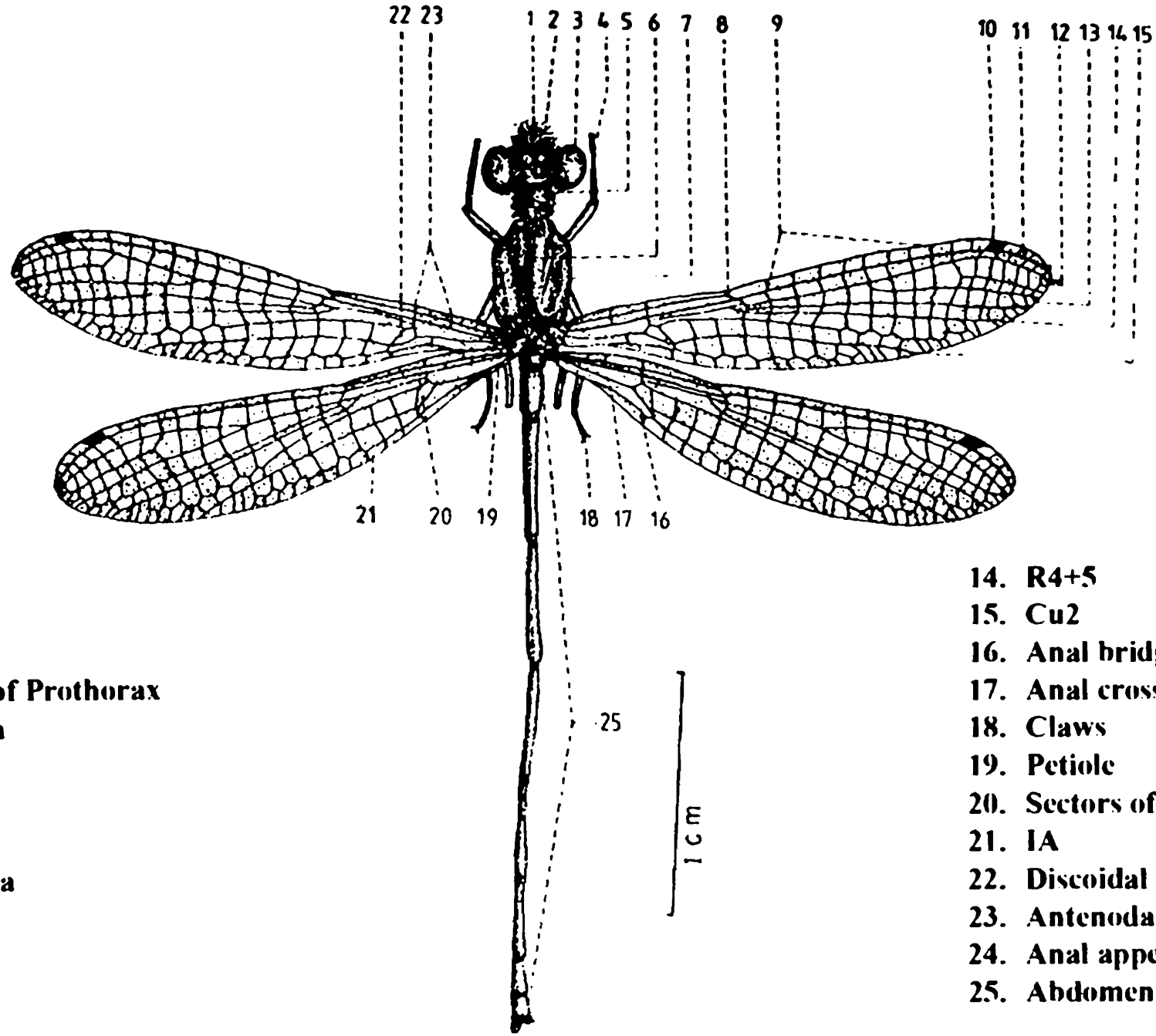
Ab : Anal bridge; *Ac* : Anal crossing; Cu_2 : second cubitus; *IA* : First anal vein; *MA* : Anterior median; mm : Millimeter; R_2 : IR_2: R_3 : IR_3 : R_{4+5} : Branches and intercalated branches of Radius; *Rspl* : Radial supplement.

(B) Glossary (Fig. 1)

Anal appendages : Small processes at the end of the abdomen of the adult insect, in male there are two pairs; in the female there is only one pair.

Anal bridge : A short longitudinal vein which runs from *Ac* parallel to the underside of the discoidal cell and is continued as *IA* in the Zygoptera.

Anal crossing : A small transverse nervure situated at the base of the wing extending from Cu_2 + *IA* to the anal bridge or hinder border of the wing. Where the neuration is at all dense, this nervure will be indistinguishable from the general neuration (Fraser, 1933b).



1. Labrum
2. Frons
3. Eyes
4. Legs
5. Middle lobe of Prothorax
6. Dorsal carina
7. Thorax
8. Node
9. Postnodals
10. Pterostigma
11. R1
12. R2
13. IR3
14. R4+5
15. Cu2
16. Anal bridge
17. Anal crossing
18. Claws
19. Petiole
20. Sectors of Arc
21. IA
22. Discoidal cell
23. Antenodals
24. Anal appendages
25. Abdomen

Fig. 1. External morphology of *Onychargia atrocyana* Selys

Anteclypeus : The part of the clypeus to which the labrum is attached.

Antehumeral stripe : a coloured line on the dorsum of the thorax situated internal to the humeral suture.

Antenodal nervure (vein) : Transverse veins running from the costa to the radius, proximal to node (towards the thorax).

Apical : Tip of wing when applied to the wings; the part most distal from the thorax when applied to the abdominal segments.

Arculus or *Arc* : Short transverse vein forming the boundary of the basal space.

Basal : The part of the wing or the abdomen which is near to the thorax.

Basal space : Sometimes termed as the *Median space*. It is a space at the extreme base of the wing bounded by the radius anteriorly, Cu_2 posteriorly and *arc* distally.

Bifurcation of R_s : The bifurcation of the superior sector of the arc into R_2 and R_{4+5}.

Bridge : A triangular space bounded outwardly by the oblique vein descending from the node, anteriorly by the nervure R_1 and posteriorly by IR_2.

Carina : A ridge running along the middorsum of thorax and abdomen.

Clypeus : The lower or the anterior part of the face, to lower part of which the labrum is attached.

Cambridge blue : Pale azure blue.

Crest of frons : The anterior ridge of the frons. It divides the anterior part from the upper posterior part of the frons.

Cubital space : The space at the extreme base of the wings situated immediately posterior to the basal space and extending out as for as the base of the discoidal cell.

Discoidal cell : A distinct triangle or a quadrilateral situated near the base of the wings immediately distal to the cubital space.

Discoidal field : The space from the distal border of the discoidal cell bounded anteriorly by *MA* and posteriorly by Cu_2 and outwardly by the wing border.

Dorsum : The back or the superior surface of any part of the body (thorax or abdomen).

Enfumed : Smoky or brownish tint in wings.

Entire : Adjective applied to any space of the wings which is not traversed by veins.

Epistome : Postclypeus or the upper part of the clypeus.

Frons : The forehead.

Hamules : Two pairs of minute hooks bounded in the genitalia on the second segment of the male.

Humeral stripe : A coloured line situated on the humeral suture of the thorax or bordering inwardly.

Hyaline : Colourless.

Hypertrigone : A triangle situated above the discoidal cell.

Labium : Lower lip.

Labrum : Upper lip.

Lilaceous : Colour of lilac blossom; pale purplish.

Neuration : The network of veins.

Node : A thickening situated at an indentation of the costal margin.

Occiput : Back of the head.

Ocellus : Also known as simple eye. Ocelli are situated in a line infront of the vesicles or arranged in a triangle around it on the vertex of the head.

Ovipositor : The female's apparatus for depositing her eggs. It is situated on the ventral surface of the 8^{th} and 9^{th} abdominal segments.

Petiolate : A term applied to the wings when the base is constricted like a stalk.

Post clypeus : The portion of the clypeus lying between the frons above and the anteclypeus below.

Posterior lobe of thorax : The anterior segment of the thorax or the prothorax is composed of three lobes. The shape of the posterior one varies from one genus to the other as well as from one species to the other.

Post nodals : Cross veins joining costa and radius extended from the node to the pterostigma.

Pruinescence : A powdery white excrescence developing on various parts of the body in adult dragonflies, usually in the male sex.

Pruinosed (= *Pulverulent*) : Coated in part or wholly with pruinescence.

Pterostigma: A small thickened area of the wings situated on the costal border near its apex.

Radius : The principal vein which lies between the subcosta and the media.

Sectors of arc : The origin of the R_{4+5} and *MA*.

Termen: The posterior border of wings.

Vesicle : A small eminence situated on the vertex of the head which either overlaps the ocelli or is situated between them.

Vulvar scale : The protective sheath of the ovipositor formed of two plate-like structures attached to the sides of the ventral plates of the 8^{th} and 9^{th} abdominal segments of the adult female.

Wedgewood blue : Pale greenish blue.

LIST OF SPECIES OF FAMILIES PLATYCNEMIDIDAE TILLYARD AND COENAGRIONIDAE TILLYARD

Family PLATYCNEMIDIDAE

1 *Coeliccia bimaculata* Laidlaw
2. *Coeliccia prakritiae* Lahiri
3. *Coeliccia renifera* (Selys)
4. *Coeliccia didyma didyma* (Selys)
5. *Coeliccia vacca* Laidlaw
6. *Coeliccia schmidti* Asahina
7. *Coeliccia rotundata* Asahina
8. *Coeliccia rossi* Asahina
9. *Coeliccia svihleri* Asahina
10. *Coeliccia fraseri* Laidlaw
11. *Coeliccia sarbottama* Lahiri
12. *Coeliccia loogali* Laidlaw
13. *Coeliccia dorothea* Fraser
14. *Calicnemia eximia* (Selys)
15. *Calicnemia miles* (Laidlaw)
16. *Calicnemia mortoni* (Laidlaw)
17. *Calicnemia sudhaae* Mitra
18. *Calicnemia miniata* (Selys)
19. *Calicnemia pulverulans* (Selys)
20. *Calicnemia mukherjeei* Lahiri
21. *Calicnemia imitans* Lieftinck
22. *Calicnemia carminea pyrrhosoma* Lieftinck
23. *Platycnemis dealbata* Selys
24. *Indocnemis orang* Foerster
25. *Copera vittata serapica* (Selys)
26. *Copera vittata assamensis* Laidlaw
27. *Copera vittata decanensis* (Laidlaw)

28. *Copera marginipes* (Rambur)
29. *Copera ciliata* (Selys)
30. *Copera superplatypes* Fraser

Family COENAGRIONIDAE

31. *Pseudagrion microcephalum* (Rambur)
32. *Pseudagrion australasiae* Selys
33. *Pseudagrion malabaricum* Fraser
34. *Pseudagrion decorum* (Rambur)
35. *Pseudagrion hypermelas* Selys
36. *Pseudagrion pruinosum* (ssp.)
37. *Pseudagrion williamsoni* Fraser
38. *Pseudagrion spencei* Fraser
39. *Pseudagrion rubriceps rubriceps* Selys
40. *Pseudagrion? andamanicum* Fraser
41. *Pseudagrion indicum* Fraser
42. *Pseudagrion laidlawi* Fraser
43. *Pseudagrion pilidorsum* (Brauer)
44. *Ceriagrion coromandelianum* (Fabricius)
45. *Ceriagrion praetermissum* Lieftinck
46. *Ceriagrion fallax cerinomelas* Lieftinck
47. *Ceriagrion olivaceum* Laidlaw
48. *Ceriagrion azureum* (Selys)
49. *Ceriagrion cerinorubellum* (Brauer)
50. *Ceriagrion erubescens* Selys [= *Ceriagrion aeruginosum* (Brauer)]
51. *Ceriagrion rubiae* Laidlaw
52. *Ischnura senegalensis* (Rambur)
53. *Ischnura elegans elegans* (Vander Linden)
54. *Ischnura forcipata* Morton
55. *Ischnura rufostigma rufostigma* Selys
56. *Ischnura rufostigma mildredae* Fraser

57. *Ischnura rufostigma anandalei* Laidlaw
58. *Ischnura inarmata* Calvert
59. *Ischnura aurora aurora* (Brauer)
60. *Ischnura pumilio* (Charpentier)
61. *Rhodischnura nursei* (Morton)
62. *Aciagrion occidentale* Laidlaw
63. *Aciagrion olympicum* Laidlaw
64. *Aciagrion approximans* (Selys)
65. *Aciagrion hisopa hisopa* (Selys)
66. *Aciagrion azureum* Fraser
67. *Aciagrion borneense* Ris
68. *Aciagrion pallidum* Selys
69. *Agriocnemis lacteola* Selys
70. *Agriocnemis pieris* Laidlaw
71 *Agriocnemis splendidissima* Laidlaw
72. *Agriocnemis clauseni* Fraser
73. *Agriocnemis nana* (Laidlaw)
74. *Agriocnemis pygmaea pygmaea* (Rambur)
75. *Agriocnemis femina femina* (Brauer)
76. *Agriocnemis dabreui* Fraser
77. *Mortonagrion aborense* (Laidlaw)
78. *Mortonagrion varalli* Fraser
79. *Argiocnemis rubescens rubeola* Selys
80. *Paracercion malayanum* (Selys)
81. *Paracercion calamorum dyeri* (Fraser)
82. *Enallagma parvum* Selys
83. *Enallagma cyathigerum cyathigerum* Charpentier
84. *Enallagma risi* Schmidt
85. *Archibasis oscillans* (Selys)
86. *Himalagrion exclamatione* Fraser
87. *Onychargia atrocyana* Selys

Super Family COENAGRIONOIDEA

Zygoptera with narrow petiolated wings; postnodals in major cases, in line with the cross-veins immediately beneath them selves; Pterostigma usually short and diamond shaped but very variable and sometimes so in fore and hind-wings and in different sexes; generally more elongate and tapering proximally in the Megapodagrionidae, or atrophied or absent and or of a peculiar shape in Pseudostigmatidae; discoidal cell fully-formed, except in the fore-wings of Permagriidae in which the base is absent; branches of R_s and that the intercalaries IR_2 and IR_3 greatly recessed so that in most forms IR_3 terminates near to or at the level of subnode, and R_{4+5} at or little proximal to that structure, subdiscoidal cell usually present, but may be contiguous with the border of the wing where the anal vein is used with the latter structure.

Distribution : Cosmopolitan.

KEY TO FAMILIES OF COENAGRIONOIDEA

(Family COENAGRIONIDAE and PLATYCNEMIDIDAE)

1. Discoidal cell elongate, anterior and posterior sides subequal (anterior side one-fifth shorter than posterior), apex almost obtuse, anal vein (*IA*) proximal to *Ac*; *Ac* lies between two antenodals; veins *MA* and IR_3 almost straight except the last end ..... PLATYCNEMIDIDAE Tillyard

– Discoidal cell short, anterior portion shorter than the posterior, distal angle acute; *IA* proximal to, at or distal to *Ac*; *Ac* lies near the first antenodal; *MA* and IR_3 zigzagged ..... COENAGRIONIDAE Tillyard

Family PLATYCNEMIDIDAE Tillyard

1863. Selys, *Platycnemis* 4me Legion. *Bull. Acad. Belg.*, (2) **16** : 150.

1917. Laidlaw, *Platycnemis* Legion 2. *Rec. Indian Mus.*, **13** : 325.

1933. Fraser, *Platycneminae, Fauna Brit. India, Odon.*, **1** : 150.

1957. Fraser, *Platycnemididae, A Reclassification of the Order Odonata*, p. 45.

The family Platycnemididae is made up of a heterogenous collection of genera agreeing only in the shape of the discoidal cell and well formal Cu_2 and *IA*.

In these dragonflies the node is situated at about one-third of the wing-length from the base; pterostigma trapezoidal; transverse arrangements of cross-veins, distal part of *MA* and more rarely the distal parts of IR_2, IR_3 and R_{4+5} are usually arising close together or near the subnode. Discoidal cell elongate; costal side a little shorter than the posterior, hence the distal angle is very rarely acute or subacute, subdiscoidal cell present; Cu_2 and *IA* well developed, the latter separating from the border of the wing at a variable level, sometimes at, sometimes to, or proximal to the level of *Ac*; which lies between the first and the second antenodals. *Arc* is at the level of the distal

antenodals; legs long and slender; the tibiae of male of the genus *Copera* Kirby are dilated, superior anal appendages often forcipate or subforcipate.

The entire median lobe of the labial mask of larvae, lateral lobes with apical teeth and setae present; caudal gills petiolated, broadened apically.

Distribution : INDIA : Throughout India.

Outside India : Albania, Algeria, Angola, Austria, Bangladesh, Belgium, Bhutan, Bulgaria, Botswana, Cameroon, Czechoslovakia, China, Comoros, Congo, Coted'ivorie, Denmark, Ethiopia, Finland, Egypt, France, Gabon, Great Britain, Greece, Hong Kong, Hungary, Indonesia, Iraq, Italy, Japan, Korea, Kampuchea, Kenya, Laos, Lebanon, Liberia, Luxemburg, Madagascar, Malawi, Malaysia, Mozambique, Myanmar (Burma), Namibia, Nepal, Netherlands, Nigeria, Norway, Oman, Papua New Guinea, Philippines, Portugal, Romania, Russia Federation, Senegal, Singapore, Solomon, Sudan, Sri Lanka (Ceylon), Swaziland, Sweden, Switzerland, Taiwan, Thailand, Tunisia, Turkey, Uganda, Vietnam, Yemen, Yugoslavia, Zambia, Zaire, Zimbabwe.

KEY TO GENERA OF THE FAMILY PLATYCNEMIDIDAE

1. Costal side of the discoidal cell in fore-wing is nearly one-fifth shorter than the posterior..... 2

– Costal side and posterior side of the discoidal cell equal or nearly so 4

2. *ab* ends at the level of *ac*; wings petiolated at the level of *ac*..... *Coeliccia* Kirby

– *ab* ends proximal to *ac*; wings petiolated short of *ac*..... 3

3. Wings long and narrow; 4-cells between the discoidal cell and oblique nervure descending from the subnode ..... *Indocnemis* Laidlaw

– Wings broader and shorter, only 3-cells between the discoidal cell and the nervure descending from the subnode ..... *Calicnemia* Selys

4. Second segment of the antennae nearly as long as third segment.... *Copera* Selys

– Third segment of the antennae equal in length to the first two taken together.... ..... *Platycnemis* Charpentier

Genus ***Coeliccia*** Kirby

1890. Kirby, *Coeliccia, Syn. Cat. Neur. Odon.*, p. 128.

1912. Ris, *Coeliccia, Suppl. Ent.*, **1** : 60-62.

1916. Laidlaw, *Coeliccia, Rec. Indian Mus.*, **13** : 322, 325, 331-333.

1932. Laidlaw, *Coeliccia, Rec. Indian Mus.*, **34** : 7-12.

1933. Fraser, *Coeliccia, Fauna Brit. India, Odon.*, **1** : 152-171.

Diagnostic characters : Zygopterans with abdomen less than twice the length of the hind-wings; black marked with blue, yellow or chrome-yellow. Head narrow,

occiput simple; posterior lobe of prothorax rounded in male, in female notched or armed with elongate spines. Wings hyaline, rounded at apices, petiolate, discoidal cell elongate, costal side about four-fifth or slightly less than four-fifth the length of the posterior side, distal side nearly half as long as basal and very oblique, so that the cell is acutely pointed at its lower distal angle; sectors of *arc* slightly separated at origin arising from the lower end of *arc*, divergent from origin; the nervure *ac* situated at a level slightly nearer the distal antenodal nervure, *ab* always present and complete, continued on as *IA*, which extends up to three-fourth the length of wings; Cu_2 extending a short distance beyond the end of *IA*; R_{4+5} arising proximal to node; IR_3 a little distal, but the position of those two are very variable in different species; pterostigma small, sides almost equal, diamond shaped, 2-3 cells between the discoidal cell and the nervure descending from the node.

Abdomen slim, cylindrical, broadened at extreme base and gradually broadening from segment 7 to the end; about one-third longer than the wings. Anal appendages: superior broad at base, acute at apex, and with inner subapical spine, inferiors longer than superiors, broad at base, abruptly tapered and subcylindrical, slightly sinuous, subacute or acute at apex.

Genitalia : Lamina narrowly but deeply cleft, hamules broad, quadrate plates meeting broadly across the genital pit; penis with apical end curling strongly over stem of organ, with end variable, deeply cleft, bifid or branched, lobe pyriform, short, with a shallow longitudinal groove running its whole length; vulvar scale robust, extending slightly beyond end of abdomen.

Type species : *Coeliccia membranipes* (Rambur, 1842: 240) of Indonesia.

Distribution : Different parts of India.

Elsewhere : Bangladesh, China, Hong Kong, Indonesia, Japan, Kampuchea, Laos, Malaysia, Myanmar (Burma), Nepal, Philippines, Singapore, Taiwan, Thailand, Vietnam.

KEY TO SPECIES OF GENUS *COELICCIA* KIRBY

1. Dorsum of thorax without antehumeral stripe 2
- Dorsum of thorax with antehumeral stripe 3
2. Dorsum of thorax with a pair of oval blue spots ..... *C. bimaculata* Laidlaw
- Dorsum of thorax with two pairs of blue spots ..... *C. didyma didyma* (Selys)
- Dorsum of thorax pale blue for lower half ..... *C. renifera* (Selys)
- Dorsum of thorax black without oval spot ..... *C. prakritiae* Lahiri
3. Dorsum of thorax with antehumeral stripe lying nearer the humeral suture than the middorsal carina ..... *C. vacca* Laidlaw
- Dorsum of thorax with antehumeral stripe closely apposed to the middorsal carina ... 4

4. Superior anal appendages with two broad spines or two inner points at their middles ..... *C. fraseri* Laidlaw

- Superior anal appendages with only one spine ..... *C. sarbottama* Lahiri

Coeliccia bimaculata Laidlaw
(Fig. 2)

1914. Laidlaw, *Coeliccia bimaculata, Rec. Indian Mus.*, **8** : 341.

1933. Fraser, *Coeliccia bimaculata, Fauna Brit. India, Odon.*, **1** : 154-155.

Material examined : Arunachal Pradesh : West Kameng, Daporijo, 1 Male, 24.xii.1965; Assam: Sangsak, 1 Male, 6.v.1979.

Distribution : INDIA : Dejoo, Upper Assam (Laidlaw, 1914); Abor Hills (Laidlaw, 1914, 1917); Tura, Garo Hills (Fraser, 1932 a, 1933 b; Lahiri, 1987; Mitra, 1999); Arunachal Pradesh (Prasad, 1997 b; Ram and Prasad, 1999; Mitra, 2006); Mizoram (Prasad, 2007 b).

Elsewhere : Bangladesh (Tsuda, 2000).

Intraspecific variation : The Assam specimen varies from Fraser's (1933 b) description in having dark brown labrum, dirty white anal appendages.

Coeliccia prakritiae Lahiri
(Fig. 3)

1985. Lahiri, *Coeliccia prakritiae, Rec. zool. Surv. India*, **82** : 62-65.

1994. Mitra, *Coeliccia prakritiae, Rec. zool. Surv. India, Occasional Paper No.* **166** : 28.

Material examined : Arunachal Pradesh: Namdhapa, 4 Male (Holotype and Paratypes).

Distribution : INDIA : Arunachal Pradesh (Lahiri, 1985).

Coeliccia renifera (Selys)
(Fig. 4)

1886 Selys, *Trichocnemis renifera, Mem. Cour. Acad. Belg.*, **38** : 119.

1890 Kirby, *Coeliccia renifera, Syn. Cat. Neur. Odon.*, p. 128.

1933 Fraser, *Coeliccia renifera, Fauna Brit. India, Odon.*, **1** : 156-159.

1997 Prasad, *Coeliccia renifera, Opusc. zool. flumin.*, **154** : 3.

Material examined : Arunachal Pradesh : Upper Subansiri, 4 Male, 25-26.x.1981.

Distribution : INDIA : Pashoke, Darjeeling (Fraser, 1932 a, b and 1933 b; Laidlaw, 1917); Arunachal Pradesh (Prasad, 1997 b; Ram and Prasad, 1999); Assam: Gopaldhara (Fraser, 1932 a, b, and 1933 b); Himachal Pradesh (Kumar and Prasad, 1981; Kumar, 2005); Mizoram (Prasad, 2007 b); Sikkim, West Bengal (Asahina, 1985), Uttar Pradesh (Bhasin, 1953).

Elsewhere : Bangladesh (Tsuda, 1991 and 2000); Nepal (Kiauta, 1975; St. Quentin, 1970).

Coeliccia sarbottama Lahiri
(Fig. 5)

1987. Lahiri, *Coeliccia sarbottama, Rec. zool. Surv. India, Occ. Paper No.* **99** : 86-87.

Material examined : Meghalaya: Wageasi, 1 Male, 06.vi.1973 (HOLOTYPE).

Distribution : INDIA : Meghalaya: Wageasi (Lahiri, 1987).

Coeliccia kumaonensis Singh and Baijal

1954. Singh and Baijal, *Coeliccia kumaonensis, Agra Univ. J. Res. (Sci.),* **3** : 398-399.

Remarks : Both Tsuda (1991) and Prasad and Varshney (1995) considered it as *C. renifera.*

Coeliccia didyma didyma (Selys)
(Fig. 6)

1863. Selys, *Trichocnemis didyma, Bull. Acad. Belg.*, (2) **16** : 155.

1890. Kirby, *Coeliccia didyma, Cat. Odon.*, p. 128.

1933. Fraser, *Coeliccia didyma, Fauna Brit. India, Odon.*, **1** : 159-160.

1984. Asahina, *Coeliccia didyma, Trans. Shikoku Ent. Soc.*, **16** (4) : 1.

2000. Tsuda, *Coeliccia didyma didyma, A distributional list of World Odonata*, p. 52.

Material examined : Meghalaya: Anogiri, 1 Male, 1 Female, 6.x.1973; 10 km east of Rongram, 1 Male, 7.xii.1977; Ranikor, 1 Male, 7.xii.1977.

Distribution : INDIA : Arunachal Pradesh: Kameng; Manipur: Chattrick, Hanggou, Nungba, Siroli, Songpeknum, Pangsang, Parbung, Tipaimuk; Meghalaya: Shillong, Cherrapunji, Khasi and Jaintala Hills; Mizoram: Lushai Hills (Asahina, 1984); Meghalaya (Lahiri, 1987); Himachal Pradesh: Shimla (Fraser, 1933c; Kumar and Prasad, 1981).

Elsewhere : Malaysia, Thailand (Tsuda, 1991 and 2000).

Coeliccia vacca Laidlaw

1932 Laidlaw, *Coeliccia vacca, Rec. Indian Mus.*, **34** : 11, 15-16.

1933 Fraser, *Coeliccia vacca, Fauna Brit. India, Odon.*, **1** : 155-156.

Material examined : 1 Female, "Type, above Tura, Garo Hills, 3500`-3900`, Assam, S. Kemp, 13.vii- 31.viii.1917, Registration No. 7965/H1" in the National Zoological collection at Central Entomological Laboratory, Zoological Survey of India, Kolkata. Nagaland: Zunheboto, Hosenephu village, 1 Male, 25.vii.1991.

Distribution : INDIA : Meghalaya (Lahiri, 1987); Nagaland (Mitra *et al.*, 2006).

Elsewhere : Bangladesh (Tsuda, 1991 and 2000).

Coeliccia schmidti Asahina

1984. Asahina, *Coeliccia schmidti, Trans. Shikoku Ent. Soc.*, **16** : 6.

Distribution : INDIA : Manipur: Khonou, Chabong (Asahina, 1984).

Coeliccia rotundata Asahina

1984. Asahina, *Coeliccia rotundata, Trans. Shikoku Ent. Soc.*, **16** : 4.

Distribution : INDIA : Manipur: Kongai, Huiahu, Pangsang (Asahina, 1984).

Elsewhere : Myanmar (Burma) (Tsuda, 2000).

Coeliccia rossi Asahina

1985. Asahina, *Coeliccia rossi, Chô Chô*, **8**(2) : 7.

Distribution : INDIA : Assam: Ledo (Asahina, 1985).

Coeliccia svihleri Asahina

1970. Asahina, *Coeliccia svihleri, Jap. J. Zool.*, **16** : 105.

Distribution : INDIA : Assam: Ledo, Kameng (Asahina, 1970), Abhoypur forest, Naphuk (Asahina, 1985), Assam (Lahiri, 2002).

Elsewhere : Myanmar (Burma) (Tsuda, 1991 and 2000).

Coeliccia fraseri Laidlaw

(Fig. 7)

1932. Laidlaw, *Coeliccia fraseri, Rec. Indian Mus.*, **34** : 11, 14-15.

1933. Fraser, *Coeliccia fraseri, Fauna Brit. India, Odon.*, **1** : 169-171.

Material examined : Meghalaya: Mawpat, 1 Male, 14.vii.1967; Mawphlong, 1 Male, 13.vii.1973.

Distribution : India : Meghalaya: Khasi Hills (Fraser, 1933b; Asahina, 1984), Mawphlong, Mawpat, Barapani, Shillong, Weiloi (Lahiri, 1987).

Coeliccia loogali Laidlaw

1932. Laidlaw, *Coeliccia loogali, Rec. Indian Mus.*, **34** : 12, 26-28.

1933. Fraser, *Coeliccia loogali, Fauna Brit. India, Odon.*, **1** : 163-165.

Distribution : INDIA : Mizoram (Prasad, 1997 a and 2007 b).

Elsewhere : Myanmar (Burma), Nepal, Thailand (Tsuda, 1991 and 2000).

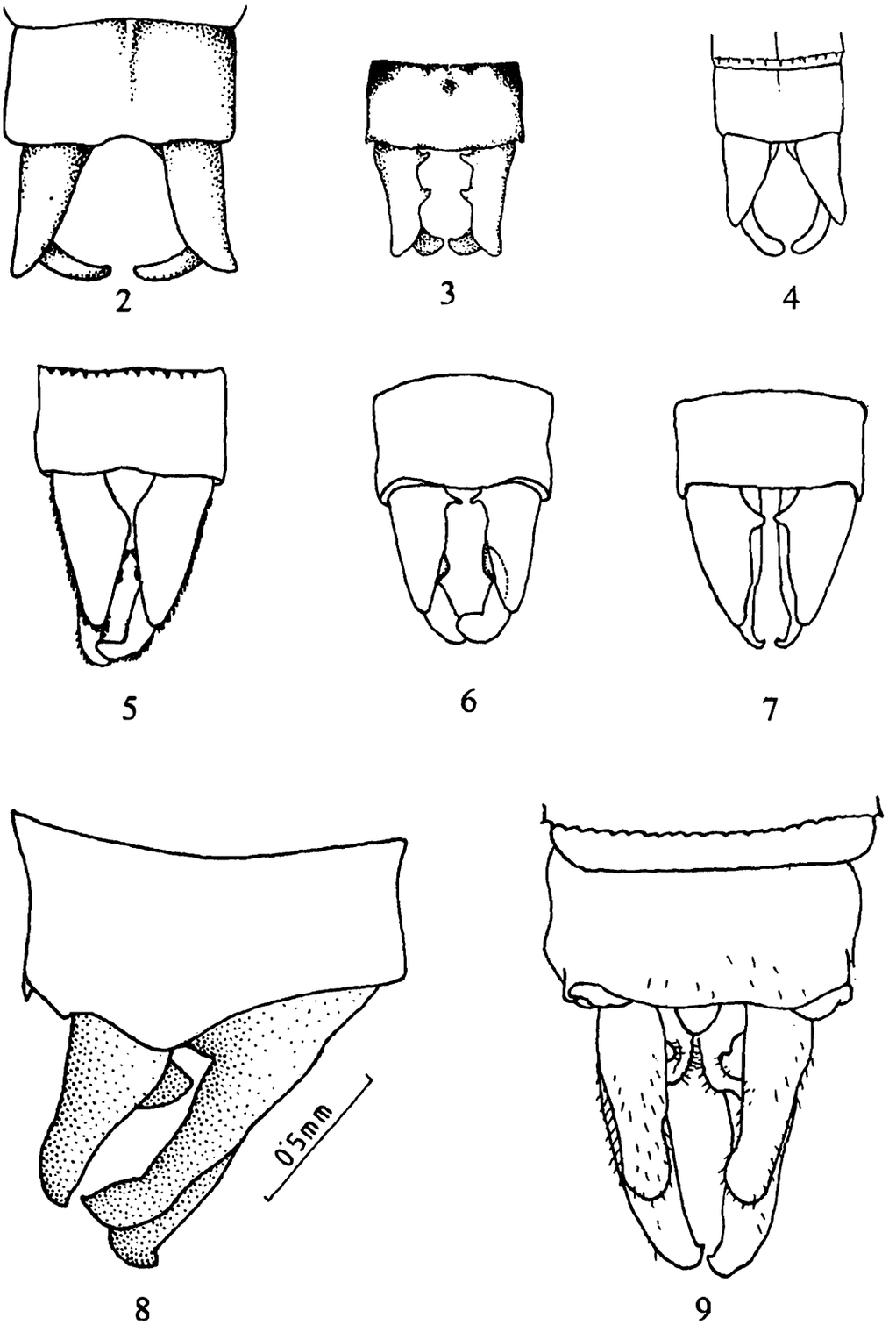
Remarks : During the preparation of the manuscript of *Geographical distribution of Odonata of Eastern India,* Mitra (2002) reported it in the section recorded from literature.

Coeliccia dorothea Fraser

1932. Fraser, *Coeliccia dorothea, J. Bombay nat. Hist. Soc.*, **36** : 466.

1933. Isuda, *Coeliccia dorothea, A distributional list of World Odonata*, 52.

Distribution : INDIA : West Bengal : Haldibari Tea Estate, Duars (Fraser, 1933c).



Figs. 2-9. 2. Dorsal view of 10th abdominal segment and anal appendages of male *Coeliccia bimaculata* Laidlaw; 3. Dorsal view of 10th abdominal segment and anal appendages of male *Coeliccia prakritiae* Lahiri; 4. Dorsal view of 10th abdominal segment and anal appendages of male *Coeliccia renifera* (Selys); 5. Dorsal view of 10th abdominal segment and anal appendages of male *Coeliccia sarbottama* Lahiri; 6. Dorsal view of 10th abdominal segment and anal appendages of male *Coeliccia didyma didyma* (Selys); 7. Dorsal view of 10th abdominal segment and anal appendages of male *Coeliccia fraseri* Laidlaw; 8. Left lateral view of 10th abdominal segment and anal appendages of male *Calicnemia eximia* (Selys); 9. Dorsal view of 10th abdominal segment and anal appendages of male *Calicnemia imitans* Lieftinck

Genus ***Calicnemia*** Strand

1863. Selys, *Calicnemis, Bull. Acad. Belg.*, (2) **16** : 159.

1933. Fraser, *Calicnemis, Fauna Brit. India, Odon.*, **1** : 171-184.

1926. Strand, *Calicnemia, Arch. Naturgesch.*, **92** A : 146.

1954. Lieftinck, *Calicnemia, Treubia*, **22** (suppl.) : 45.

Diagnostic characters : Moderately slender built zygopterans, abdomen less than thrice the length of hind-wings; body coloured red or bright chrome-yellow marked with black, or more rarely black partially obscured by pruinescence. Head narrow, posterior lobe of prothorax rounded and simple in both sexes. Wings hyaline, rounded at apices, never falcate, petiole moderately long; discoidal cell elongate costal side about three-fourths the length of the posterior, distal side at least half as long as the basal, and very oblique, so that the cell is acutely pointed at least its lower distal angle; sectors of *arc* arising from the lower end of the *arc* and divergent from origin; the vein *ac* situated slightly nearer to the level of the distal antenodal nervure; *ab* always present and complete, continued on as *IA*, which practically extends for nearly three-fourths the length of wings; petiolation starts proximal to the level of *ac; Cu*$_2$ extending for a short distance beyond the end of *IA*; R_{4+5} arising well proximal to the level of the subnode; IR_3 a little distal to it, 3-4 cells between the discoidal cell and the nervure descending from the subnode. Abdomen cylindrical; anal appendage homogeneous; superior as long as inferiors, ending in two branches, one of which simulates a long robust subbasal ventral spine, the other directed straight back to from the apex of appendage; inferior appendages long, tapered, sinuous.

Genitalia : Lamina narrowly and deeply cleft; hamules broad, quadrate plates meeting broadly across the middle line; lobe flask shaped, deeply grooved on its ventral surface, penis resembles those of *Coeliccia*; the apex dividing in to two long curled branches which curve down to embrace the stem of origin; vulvar scales short and robust.

Type species : *Calicnemis eximia* Selys

Distribution : Different parts of India.

Elsewhere : Afghanistan, Bangladesh, Bhutan, China, Hong Kong, Laos, Malaysia, Myanmar (Burma), Nepal, Taiwan, Thailand, Vietnam.

KEY TO SPECIES OF GENUS *CALICNEMIA* STRAND

1. Beneath head entirely black 4

– Head black marked with yellow 2

2. Abdomen black, marked with ferruginous, post humeral yellow spot absent or vestigial, front of head black, marked with red or citron-yellow 3

– Abdomen red up to segment 6, rest black 5

– Abdomen vermillion red, without upper post humeral spot on thorax, face and head as far black as posterior ocellus red without marking..... *C. eximia* (Selys)

3. Abdomen black, with segments 1 and 2 and base of 3 brick red or bright ochreous; front of head and face black ..... *C. mortoni* (Laidlaw)

– Abdomen black from segment 6 to 10, basal segments red, not more than 14 to 15 postnodals in fore-wing ..... *C. miles* (Laidlaw)

– Abdomen red, with black marking on three end segments only; 19-20 postnodals ..... *C. miniata* (Selys)

4. Abdomen 32-34 mm in male, 31 mm in female; hind-wing 25-27 mm in male, 25-26 mm in female ..... *C. pulverulans* (Selys)

– Abdomen 28-30 mm in male, 28 mm in female; hind-wing 20-22 mm in male, 22 mm in female ..... *C. sudhaae* Mitra

– Abdomen 30-32 mm in male, 29-30 mm in female; fore-wing 21 mm in male, 20.5 mm in female ..... *C. imitans* Lieftinck

5. Abdomen + anal appendages 34 mm ..... *C. mukherjeei* Lahiri

– Abdomen + anal appendages 27-31 mm ..... *C. carminea pyrrhosoma* Lieftinck (on the basis of Lieftinck's description)

Calicnemia eximia (Selys)
(Fig. 8)

1863. Selys, *Calicnemis eximia, Bull. Acad. Belg.*, (2) **16** : 160.

1933. Fraser, *Calicnemis eximia, Fauna Brit. India, Odon.*, **1** : 174-175.

Material examined : Arunachal Pradesh: Namdhapa, 1 Male, 24.iv.1981; Siang, 1 Male, 22.x.1966; Nagaland: Zunheboto, 2 Male, 06.iv.1991; 1 Female, 12.vii.1991; 2 Male, 17.vii.1991; 1 Male, 27.vii.1991; Sikkim : Gangtak, 1 Male, 27.x.1977; West Bengal: Darjeeling 3 Male, 7.iv.1973; 8 Male, 1 Female, 20.iv.1973; 1 Male, 18.iv.1973; 2 Male, 1 Female, 16.iv.1976.

Distribution : INDIA : Arunachal Pradesh (Lahiri, 1987; Ram and Prasad, 1999; Mitra, 2006); Himachal Pradesh (Lieftinck, 1984; Kumar and Prasad, 1981; Kumar, 2005); Mizoram (Prasad, 1997 b and 2007 b); Nagaland (Mitra *et al.*, 2006); Sikkim (Fraser, 1933 a; Mitra, 2003 b); Uttarakhand (Prasad and Mondal, 2010), Kumaon (Laidlaw, 1917), Dehra Dun (Mitra, 2000); Uttar Pradesh (Bhasin, 1953); West Bengal (Srivastava and Sinha, 1993).

Elsewhere : Afghanistan (Lieftinck *et al.*, 1984); Bhutan (Mitra, 2008); China (Chao, 1981; Needham, 1932); Nepal (St. Quentin, 1970); Taiwan (Lieftinck *et al.*, 1984); Bangladesh, Vietnam (Tsuda, 1991 and 2000).

Intraspecific variations : Specimens studied do not vary among themselves, but they vary from the description provided by Fraser (1933 b) having labrum, bases of mandibles and vertex brick red instead of vermillion red as in literature.

Calicnemia imitans Lieftinck
(Fig. 9)

1948. Lieftinck, *Calicnemia imitans, Arkiv. Zool.*, **41** : 12-15.

1987. Lahiri, *Calicnemia imitans, Rec. zool. Surv. India, Occ. Paper No.* **99** : 80.

Material examined : Meghalaya : Balat, 1 Male, 8.xii.1977; Pynursla, 1 Male, 29.viii.1942; Sonapurdi, 4 Male, 2 Female, 28.vii.1974.

Distribution : INDIA : Meghalaya (Lahiri, 1987).

Elsewhere : China, Myanmar (Burma), Nepal, Thailand (Tsuda, 2000).

Calicnemia mortoni (Laidlaw)
(Fig. 10)

1917. Laidlaw, *Calicnemis mortoni, Rec. Indian Mus.*, **13** : 326-327.

1933. Fraser, *Calicnemis mortoni, Fauna Brit. India, Odon.*, **1** : 183-184.

2000. Tsuda, *Calicnemia mortoni, A distributional list of World Odonata*, p. 52.

2002. Mitra, *Calicnemia mortoni, Memoirs zool. Surv. India*, **19**(1) : 54.

Material examined : West Bengal : Darjeeling, Pashoke, 1 Male, June 1916 (Holotype deposited in Zoological Survey of India, Kolkata- 700 053).

Distribution : INDIA : Sikkim: Gangtak (Lieftinck, 1984); West Bengal: Pashok, Darjeeling (Laidlaw, 1917).

Elsewhere : Bhutan (Tsuda, 2000); Nepal (Ushijima, 2002); Vietnam (Cuong and Hoa, 2007).

Calicnemia mukherjeei Lahiri
(Fig. 11)

1976. Lahiri, *Calicnemia mukherjeei, Odonatologica*, **5** : 273-276.

1987. Lahiri, *Calicnemia mukherjeei, Rec. zool. Surv. India, Occ. Paper No.* **99** : 80-81.

1999. Mitra, *Calicnemia mukherjeei, Rec. zool. Surv. India, Occ. Paper No.* **170** : 15.

2000. Tsuda, *Calicnemia mukherjeei, A distributional list of world Odonata*, p. 52.

Material examined : Meghalaya : Shillong, 1 Male, 12.viii.1974; 1 Female, 22.viii.1974; Barpani Road, 2 Male, 6.iv.1973.

Distribution : INDIA : Meghalaya (Lahiri, 1976 and 1987).

Remarks : The late Dr. M.A. Lieftinck (1984) wrote, "*The males of mukherjeei were collected at the foot of a small spring falling from some height, shaded with overhanging plants, but the female was collected from dried up nalla, quite far away from water (1976: 275). I have not seen the latter specimen but am much in doubt about the correctness of the sex association. Hence I consider the female to be still unknown*" We too feel the same.

Calicnemia miles (Laidlaw)
(Fig. 12)

1886. Selys, *Calicnemis eximia* race *atkinsoni* (*C. eximia* Female nec. *Atkinsoni*), *Mem. Cour.*, **38** : 131-132.

1891. Selys, *Calicnemis atkinsoni, Ann. Mus. Civ. Genova*, (2) **10** (30) : 503-505.

1917. Laidlaw, *Calicnemis miles, Rec. Indian Mus.*, **13** : 330.

1933. Fraser, *Calicnemis miles, Fauna Brit. India, Odon.*, **1** : 178-181.

2002. Mitra, *Calicnemia miles, Memoirs zool. Surv. India*, **19** (1): 54.

Material examined : Manipur : Moirang, 1 Female 1 Male, 13.xi.1981; New Churachand Pura, 1 Female, 19.ix.1975; Morch, 2 Female, 16.xi.1975; West Bengal: Darjeeling, 1 Male, 27.v.1975; 2 Male, 30.v.1975.

Distribution : INDIA : Himachal Pradesh (Kumar and Prasad, 1981; Kumar, 2005); Manipur (Mitra, 2002 b); Punjab Shivalik (Sharma and Kumar, 2008); Sikkim (Fraser, 1932 b and 1933 b; Mitra, 2003 b); Uttarakhand: Chamoli, Dehra Dun, Garhwal, Pawi, Tehri (Singh and Prasad, 1974; Kumar and Prasad, 1981); Uttar Pradesh (Bhasin, 1953); West Bengal (Mitra, 2002 b).

Elsewhere : Bhutan (Lieftinck, 1977); Myanmar (Burma) (Fraser, 1932 b and 1933b; Lieftinck, 1977; Selys, 1891); Thailand (Lieftinck, 1984; Tsuda, 1991 and 2000); Vietnam (Cuong and Hoa, 2007).

Intraspecific variation : Specimens at hand do not vary distinctly one from other, but both sexes among them vary from the description made by Fraser (1933 b) in having brown labium and anal appendages instead of pale brown labium in male and yellow in female and dark brown anal appendages in both male and female.

Calicnemia miniata (Selys)
(Figs. 13, 73)

1886. Selys, *Calicnemis miniata, Mem. Cour.*, **38** : 132.

1933. Fraser, *Calicnemis miniata, Fauna Brit. India, Odon.*, **1** : 177-178.

1991. Tsuda, *Calicnemia miniata, A distributional list of World Odonata*, p. 51.

2002. Mitra, *Calicnemia miniata, Memoirs zool. Surv. India*, **19** (1) : 54.

Material examined : West Bengal: Darjeeling, 1 Male, 15.v.1987.

Distribution : INDIA : Mizoram (Prasad, 1997 c and 2007 b); Sikkim (Fraser, 1933 b); West Bengal (Srivastava and Sinha, 1993), Darjeeling (Fraser, 1933 b; Mitra, 2002 b).

Elsewhere : Bangladesh (Tsuda, 1991); China (Needham, 1931); Nepal (Kiauta and Kiauta, 1982 a).

Calicnemia sudhaae Mitra
(Figs. 14, 15)

1994. Mitra, *Calicnemia sudhaae, Rec. zool. Surv. India, Occ. Paper No.* **166** : 28.

2002. Mitra, *Calicnemia sudhaae, Memoirs zool. Surv. India,* **19** (1) : 54-56.

Material examined : Mizoram : Teirei, 3 Male, 1 Female, 24.x.1991; Bung, 3 Male, 26.x.1991.

Distribution : INDIA : Mizoram (Mitra, 1994 and 2002 b).

Remarks : The species apparently looks like *C. imitans* Lieftinck (1948) but differs from the species in colour marking of different body parts, measurements of abdomen and hind-wings and shape of anal appendages. Babu and Nandy (2009) in a comparative study of *C. pulverulans, C. sudhaae* and *C. imitans* remarked the distinctness of the species. Among these three species, *C. sudhaae* and *C. imitans* resembles more than that of *C. pulverulans*. But distinct differences in the anal appendages of *C. sudhaae* and *C. imitans* support Babu and Nandy's contention.

Calicnemia pulverulans (Selys)
(Figs. 16, 17)

1886. Selys, *Calicnemis pulverulans, Mëm. Cour.,* **38** : 133.

1933. Fraser, *Calicnemis pulverulans, Fauna Brit. India, Odon.,* **1** : 175-177.

2002. Mitra, *Calicnemia pulverulans, Memoirs zool. Surv. India,* **19**(1): 149.

Material examined : Arunachal Pradesh: West Kameng, 1 Male, 24.xii.1965; Nagaland: Mon district, 1 Male, 8.vi.1991; Sikkim: Lingjok, 1 Male, 20.v.1962; Uttarakhand: Chamoli: Debal, 1 Male, 1 Female, 03.ix.1972.

Distribution : INDIA : Arunachal Pradesh (Ram and Prasad, 1999); Nagaland (Mitra *et al.*, 2002 and 2006); Mizoram (Prasad, 2007 b); Sikkim (Babu and Nandy, 2009); Uttarakhand (Kumar and Prasad, 1981; Babu and Nandy, 2009).

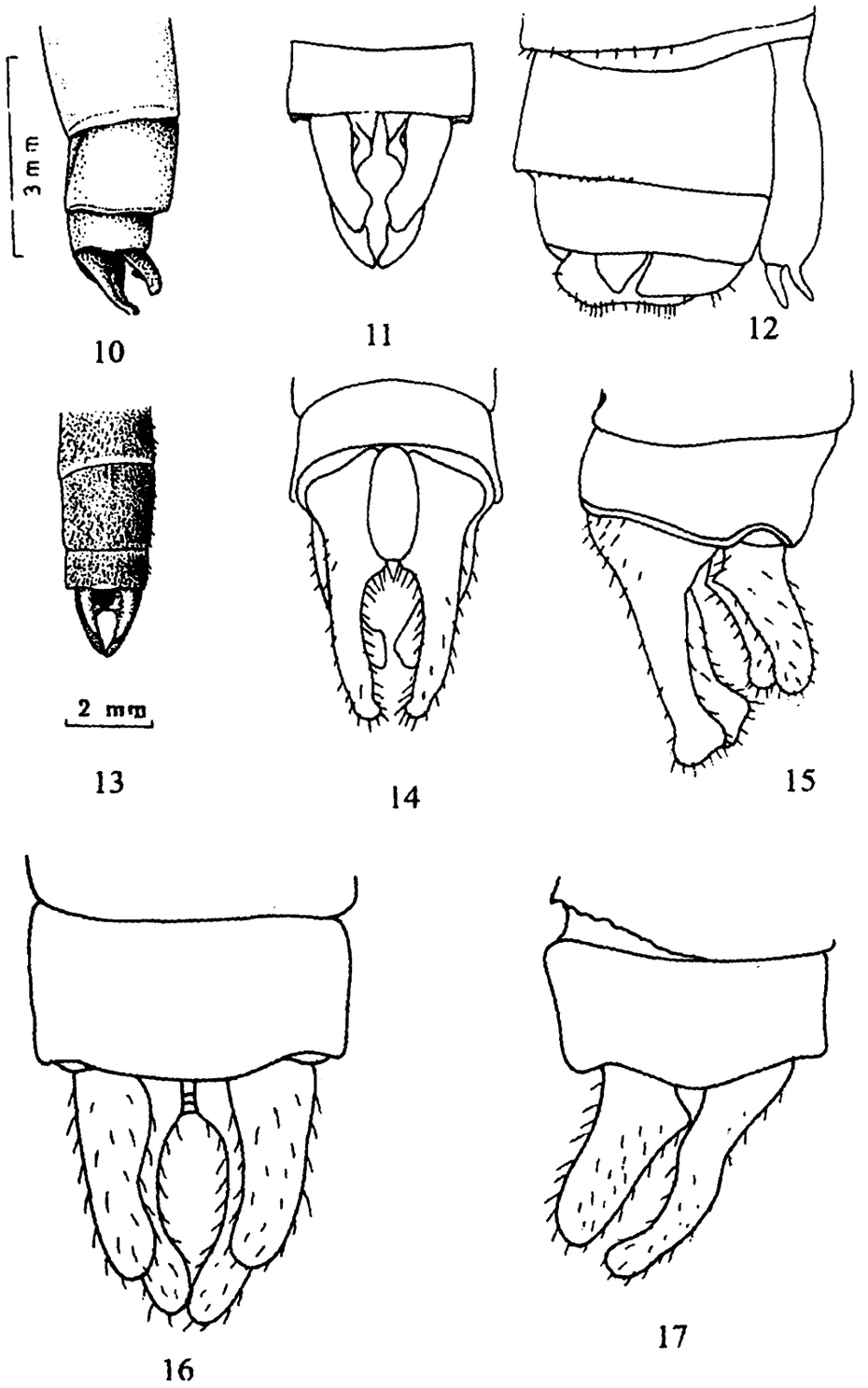
Elsewhere : Bangladesh, Myanmar (Tsuda, 2000); Nepal (Sasamoto and Ushijima, 2000; Ushijima, 2002).

Calicnemia carminea pyrrhosoma Lieftinck

1984. Lieftinck, *Calicnemia carminea pyrrhosoma, Odonatologica,* **13** : 355, 360.

No properly identified material could be obtained for study.

Lieftinck described the population from specimens collected: Holotype 1 Male and the first Female, Dehra Dun Valley, Sulphur springs *ca.* 700 m, 4-13.viii.1978; N.W. India: 3 Male, 2 Female, Uttar Pradesh, Dehra Dun valley, Sulphur springs, *ca.* 700 m, 4-13.viii.1978; 2 Male, 1 Female, Sahastradhara (Sulphur springs) 10 km West Dehra Dun, 700 m, 11.x.1981 (Male, Female) and 19.x.1981 (Male). Sangal and Tyagi (1984) in the abstract of the *First Indian Symposium of Odonatology* reported "*Calicnemia miniata doonensis*" as the only known subspecies of *miniata*. But



Figs. 10-17. 10. Right lateral view of 9th and 10th abdominal segments and anal appendages of male *Calicnemia mortoni* (Laidlaw); 11. Dorsal view of 10th abdominal segment and anal appendages of male *Calicnemia mukherjeei* Lahiri; 12. Right lateral view of 9th and 10th abdominal segments and anal appendages of female *Calicnemia miles* (Laidlaw); 13. Dorsal view of 9th and 10th abdominal segments and anal appendages of male *Calicnemia miniata* (Selys); 14. Dorsal view of 10th abdominal segment and anal appendages of male *Calicnemia sudhaae* Mitra; 15. Right lateral view of 10th abdominal segment and anal appendages of male *Calicnemia sudhaae* Mitra; 16. Dorsal view of 10th abdominal segment and anal appendages of male *Calicnemia pulverulans* (Selys); 17. Left lateral view of 10th abdominal segment and anal appendages of male *Calicnemia pulverulans* (Selys)

unfortunately Hämäläinen (1989) clearly stated that identification of *C. m. doonensis* was wrong. On the other hand Dr. Hämäläinen pleaded for the priority of *doonensis* over Lieftinck's *carminea*. Dr. Hämäläinen kindly presented a specimen labelled as *C. doonensis doonensis*. From the above facts Mitra (2005) concluded *C. m. doonensis* is a synonym of *C. c. pyrrhosoma* Lieftinck. Prasad and Varshney (1995) reported *Calicnemia carminea carminea* Lieftinck from Uttar Pradesh. It occurs in Nepal. Prasad and Varshney (1995) reported both *Calicnemia carminea pyrrhosoma* and *Calicnemia doonensis doonensis* from India. The latter does not exist, since *Calicnemia carminea pyrrhosoma* is the valid name.

Calicnemia mahesi Sahni

1964. Sahni, *Calicnemia mahesi, Agra Univ. J. Res.(Sci.).*, **13** : 80.

Kumar and Prasad (1981) and Tyagi (1983) reported *C. mahesi*. Prasad and Varshney (1995) reported it as *Coeliccia renifera* Selys. But the type material is not available, and the figure as well as description indicate that species does not belong to the genus *Calicnemia* Strand. Hence it is not being included in the fauna and *it is believed not occurring in India.*

Genus ***Platycnemis*** Charpentier

1840. Charpentier, *Platycnemis, Lib. Europ.*, p. 21.

1933. Fraser, *Platycnemis, Fauna Brit. India, Odon.*, **1** : 187-191.

Diagnostic characters: Dragonflies with abdomen less than twice the length of wings; coloured bluish-white marked with black or brown. Head narrow, occiput deeply hollowed out; posterior lobe of prothorax simple; wings hyaline, moderately rounded at apices; petiolated to the level of the proximal antenodal nervure, discoidal cell elongate, costal and posterior sides almost equal in length, distal side is almost half the length of the basal; outer end is acutely pointed at its lower end; sectors of *arc* arising from lower end of the *arc* and divergent at origin. The nervure *ac* situated about midway between the two antenodal nervures; *ab* always present and complete, continued on as *IA*, which extends about half the length of the wings; petiolation begins well proximal to *ac*; Cu_2 reaches six cells beyond the *IA*; R_{4+5} arises well before the level of the subnode; IR_3 at the level of the vein descending from the subnode; two cells between the discoidal cell and nervure descending from the subnode; pterostigma small, oblique, diamond shaped, braced covering about one cell. Thorax and abdomen moderately thick; abdomen cylindrical. Hinder pair of tibiae dilated. Anal appendages: superiors shorter than inferiors; inferiors sinuous, tapered gradually and curved inwards nearly to meet at apices.

Genitalia : Lamina deeply cleft, hamules are broad quadrate plates, meet across the middle line; apical end of penis curved but not bifurcated, furnished at each side with a fine long curling branch directed some-what backwards, and outwards; lobe flask shaped. Female with short vulvar scales not extending up to the end of the abdomen.

Type species : *Platycnemis pennipes* Pall.

Distribution : INDIA (Kashmir).

Elsewhere : Afghanistan, Albania, Algeria, Angola, Australia, Belgium, Bulgaria, Cameroon, China, Comoros, Congo, Coted'Ivorie, Crotia, Czeck and Slovakia, Denmark, Egypt, Estonia, Finland, France, Gabon, Gambia, Ghana, Germany, Great Britain, Greece, Guinea, Hungary, Iran, Iraq, Israel, Japan, Korea, Latvia, Lebanon, Liberia, Lithuania, Luxemburg, Macedonia, Madagascar, Mali, Mauritius, Morocco, Netherlands, Nigeria, Norway, Pakistan, Poland, Portugal, Romania, Russia Federation, Senegal, Sierra Leone, Slovenia, Spain, Switzerland, Syria, Tunisia, Turkey, Uganda, Ukraine.

Platycnemis dealbata Selys
(Figs. 18, 74)

1863. Selys, *Platycnemis latipes* race *dealbata, Bull. Acad. Belg.*, (2) **16** : 167.

1890. Selys, *Platycnemis dealbata, Rev. Odon. Add. et. Corrig.*, p. 388.

1933. Fraser, *Platycnemis latipes dealbata, Fauna Brit. India, Odon.*, **1** : 188-191.

1991. Tsuda, *Platycnemis dealbata, A distributional list of World Odonata*, p. 54.

Material examined : Pakistan : Choa, Saidan Shah Salt Range, 1 Female, 25.iv.1931; 1 Male, 30.iv.1931.

Distribution : INDIA : Kashmir (Fraser, 1933 b).

Elsewhere : Afghanistan, Egypt, Iran, Iraq, Israel, Lebanon, Russia (Fed.), Syria, Turkey (Tsuda, 2000); Pakistan (Mitra and Babu, 2009).

Remarks : The specimen agrees with the description present in the *Fauna of British India.*

Genus ***Indocnemis*** Laidlaw

1917. Laidlaw *Indocnemis, Rec. Indian Mus.*, **13** : 325.

1933. Fraser, *Indocnemis, Fauna Brit. India, Odon.*, **1** : 185-187.

Diagnostic characters: Dragonflies with abdomen less than twice the length of hind-wings; coloured black, marked with azure blue. Head narrow, occiput simple, posterior lobe of prothorax rounded and simple. Wings hyaline, petiolation moderately long; discoidal cell elongate, costal side nearly three quarters the length of posterior in fore-wing, four-fifth in the hind-wing; distal side at least half in long as the basal and the cell is acutely pointed at its lower distal angle; the distal side is very oblique. Sectors of *arc* arising from the lower end of the *arc* and divergent at origin; *ac* situated midway between the antenodal nervures; *ab* complete, always present and continued on as *IA*, which extends distally more than half the length of wings. Petiolation begins slightly proximal to the vein *ac*; Cu_2 extends for a short distance beyond the end of *IA*; R_{4+5} arising fairly proximal to the level of the nervure descending from the subnode; IR_3 arising in continuation of that nervure; pterostigma longer than broad,

proximal side very oblique, distal side much less so, 4- cell distance lie between the discoidal cell and the nervure descending from the subnode. Abdomen cylindrical, long and slender, broadens towards the end segments. Anal appendages: Superiors blunt at apex, hollowed out within and with two inner spines, one subapical, the other subbasal; inferiors considerably longer than superiors, cylindrical, broad at base, forcipate, the apices curling gently inwords.

Type species : *Indocnemis kempi* Laidlaw.

Distribution : India.

Elsewhere : Bangladesh, China, Malaysia, Thailand, Vietnam.

Indocnemis orang (Förster)
(Figs. 19, 75)

1907. Förster in Laidlaw, *Trichocnemis orang,* Fasc. *Malayenses, Zool. 4, Odon.* **2** : 2-4.

1917. Laidlaw, *Indocnemis kempi, Rec. Indian Mus.*, **13** : 325.

1931. Laidlaw, *Indocnemis orang, J. Fed. Mal. States Mus.* **16** : 193-194.

1933. Fraser, *Indocnemis kempi, Fauna Brit. India, Odon.*, **1** : 186-187.

1954. Lieftinck, *Indocnemis orang, Treubia,* **22** (suppl.) : 50.

1984. Davies and Tobin, *Indocnemis orang, The dragonflies of the World,* **1** : 99.

1987. Lahiri, *Indocnemis kempi, Rec. zool. Surv. India, Occ. Paper No.* **99** : 89.

1991. Tsuda, *Indocnemis orang, A distributional list of World Odonata,* p. 53.

Material examined : Meghalaya: Umran, 3 Male, 7.vii.1970.

Distribution : INDIA : Meghalaya (Lahiri, 1987).

Elsewhere : Bangladesh, China, Malaysia, Thailand, Vietnam (Tsuda, 2000).

Remarks : Dr. Lahiri used *kempi* instead of *orang* without citing any reason; probably he used it out of ignorance.

Genus ***Copera*** Kirby

1863. Selys, *Psilocnemis, Bull. Acad. Belg. Sci.*, (2) **15** : 168.

1890. Kirby, *Copera, Syn. Cat. Neur. Odon.*, 129.

1933. Fraser, *Copera, Fauna Brit. India, Odon.*, **1** : 191.

Diagnostic characters : Zygopterans with white, blue or rarely partly reddish marked with black or brown; second segment of the antenna either as long as or longer than the third segment; posterior lobe of prothorax simple, rounded or deeply notched in females; tibiae of males dilated in some species, but never in female. Wings hyaline, pterostigma a little longer than the width; generally 11-15 postnodals in fore-wings, 9-13 in the hind-wings; IR_3 arises at the level of the subnode, the origin of R_{4+5} is slightly proximal to that level; discoidal cell with costal and inner margin nearly equal.

Abdomen slim and cylindrical; anal appendages of variable size and shape, superiors triangular or rounded, sometimes hooked, nearly equal or slightly shorter than the segment 10; inferiors 2-4 times as long as superiors, ungulate or tapering to an acute apex, curved inwards, upwards and downwards; penis squarish, with or without a pair of short apical flagella.

Type species : *Platycnemis marginipes* Selys, 1863.

Distribution : Different parts of India.

Elsewhere : Bangladesh, China, Hong Kong, Indonesia, Japan, Kampuchea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Taiwan, Thailand, Vietnam.

KEY TO SPECIES OF GENUS *COPERA* KIRBY

1. Two pairs of hind tibiae white and widely dilated 2

– Two pairs of hind tibiae yellow, reddish, or brownish, either slightly or not at all dilated 3

2. Legs very long, hind femora extending nearly to end of the segment 2; second abdominal segment wholly black on dorsum; inferior anal appendages strongly arched, apices black ..... *C. ciliata* (Selys)

– Legs very short, hind femora extending only to the end of the thorax; second abdominal segment with two dorsal blue spots, inferiors quite straight and apices white ..... *C. superplatypes* Fraser

3. Superior anal appendages only one-fourth the length of the inferiors; female with posterior lobe of prothorax without spines ..... *C. marginipes* (Rambur)

– Superior anal appendages at least half the length of inferiors; female with two spines with posterior lobe of prothorax ..... *C. vittata* (Selys) complex

Copera vittata - complex

Copera vittata was described by Selys in 1863 as *Psilocnemis vittata*. Kirby (1890) named it *Copera vittata* (Selys). Kirby merged *Psilocnemis serapica* Selys (1863) with *C. vittata*. Laidlaw (1917) described south-Indian (Western Ghats) forms as *Copera vittata decanensis*; it was supported by Fraser (1923, 1931). Fraser (1933 b) combined *decanensis* with *vittata*. Fraser (1933 b) reported that female of *serapica* agrees with female of *C. vittata*. But Mitra (2002 b) cited that a female of *serapica* from the Nicobars varies from the female of Arunachal Pradesh in having dark-brown thorax, yellowish–blue antehumeral stripe, reddish-yellow middorsal carina. Fraser (1933 b), while commenting on its (*C. vittata*) relationship with *C. marginipes* commented, *"Almost identical with that of C. marginipes, if we consider as mere races or colour varieties all the forms which have been described as separate species. The colouring seems to have been the only factor considered in forming new species or subspecies; but varying degrees of melanism are found even in the same localities, and depend largely on the age of the specimens or the time of the year; wet- and dry- season*

forms undoubtedly occur. C. atomaria, from Borneo represents maximum melanism in the species, whilst dry-season forms from the West coast of India show remarkably little of this. I have examined specimens from South India (Malabar, Coorg, Anaimalais), Assam, Bengal, Lower Burma and Siam, and find that they all show infinitive variety of markings, often confluent, as often discrete. On the other hand none differs so far as the shapes of the anal appendages, the legs of the male and posterior lobe of prothorax of the female are concerned" Moreover, Fraser (1933 b) comments, *"C. serapica from the Nicobars, is most certainly the female of C. vittata; the shape of the posterior lobe of prothorax at once determines it"*. Therefore, for the present purpose, Tsuda's (1991 and 2000) classification is followed here.

Copera vittata assamensis Laidlaw
(Fig. 20)

1914. Laidlaw, *Copera vittata assamensis, Rec. Indian Mus.*, **8** : 342-343.

1917. Laidlaw, *Copera vittata assamensis, Rec. Indian Mus.*, **13** : 338.

1933. Fraser, *Copera assamensis, Fauna Brit. India, Odon.*, **1** : 201-203.

1991. Tsuda, *Copera vittata assamensis, A distributional list of World Odonata,* p. 53.

Material examined : Arunachal Pradesh: Chandan Forest, 1 Male, 24.iii.1973; Assam: Goalpara, 1 Female, 8.vi.1973; Manipur: Morch, 2 Male, 24.ii.1975.

Distribution : INDIA : Assam: North Lakimpur (Laidlaw, 1914); Arunachal Pradesh, Assam (Brahmaputra valley), Manipur (Mitra, 1994 and 2002 b).

Elsewhere : India (Assam) to Indo-China (Fraser, 1933 a, b); Myanmar, Nepal (Tsuda, 2000).

Copera vittata serapica (Selys)
(Fig. 22)

1863. Selys, *Psilocnemis vittata, Bull. Acad. Belg.*, (2) **13** : 170.

1886. Selys, *Psilocnemis vittata, Mem. Cour. Acad. Belg.*, **38** : 121-122.

1890. Kirby, *Copera vittata, Syn. Cat. Neur. Odon.*, p. 129.

1933. Fraser, *Copera vittata, Fauna Brit. India, Odon.*, **1** : 198.

1991. Tsuda, *Copera vittata serapica, A distributional list of World Odonata,* p. 53.

Material examined : Arunachal Pradesh: Namsai, 1 Female, 5.iii.1969; Great Nicobar: South Bay, 1 Female, 10.viii.1984.

Distribution : INDIA : Assam, Cochin (Laidlaw, 1917); Coorg, Malabar, Nilgiris, Wyanad (Fraser, 1924 a); Anaimalai (Fraser, 1933 a); Bengal (Fraser, 1933 b); Sibsagar (Bhasin, 1953); Andaman and Nicobar Islands : Great Nicobar (Mitra, 1995a); Arunachal Pradesh (Mitra, 1994, 2002 b and 2006); Himachal Pradesh (Kumar and Prasad, 1981; Kumar, 2005); Meghalaya (Lahiri, 1987; Mitra, 1999); Uttarakhand: Dehra Dun (Kumar and Prasad, 1981; Kumar and Mitra, 1998).

Elsewhere : Myanmar (Fraser, 1933 b; Bhasin, 1953); Bangladesh (Tsuda, 2000).

Copera vittata decanensis (Laidlaw)

1917. Laidlaw, *Copera vittata decanensis, Rec. Indian Mus.*, **13** : 338-339.

1933. Fraser, *Copera vittata, Fauna Brit. India, Odon.*, **1** : 198.

2000. Tsuda, *Copera vittata decanensis, A distributional list of World Odonata,* p. 54.

Distribution : INDIA : Parambikulam (Laidlaw, 1917); Western Ghats (Fraser, 1933 b); Andhra Pradesh (Prasad, 2007 a); Karnataka: Kudremukh National Park (Emiliyamma and Radhakrishnan, 2007), South Western Karnataka (Subramanian *et al.*, 2008); Kerala (Emiliyamma *et al.*, 2007), New Amarambalam Reserve Forests (Rao and Lahiri, 1982); Maharashtra (Babu and Nandy, 2010), Pench National Park, Tadoba Andhari Tiger Reserve, Sanjay Gandhi National Park (Kulkarni *et al.*, 2004, 2006 a and b); Tamil Nadu (Emiliyamma, 2009).

Remarks : Fraser (1933 b) commented as follows: "*The west coast forms are described as a subspecies by Laidlaw under the name of C. vittata decanensis. Although during life, and sprit, specimens appear to be more brightly coloured than those described from elsewhere by other authors, after death when dried, much of this bright colouring is replaced by more drab browns and reds. Thus C. vittata decanensis has the legs bright- citron yellow and the sides of the thorax bright greenish-yellow, whilst the humeral stripe and abdominal markings are pale blue, as also the anal appendages; these colours give place to drab shades after drying*"

Copera vittata
(Fig. 23)

Lahiri (1987) reported 6 Male, 5 Female, this indeterminate taxon. He reported that the late Dr. M.A. Lieftinck considered it as an indeterminate subspecies of *Copera vittata vittata*. The study of the measurement of different body parts of the specimens reported and the nodal indices as well as colour of the different parts of the body clearly indicate it is nothing but *Copera vittata serapica* (Selys). At best it can be said that revision of numerical data could be added to the previous description of *Copera vittata serapica* (Selys).

Copera marginipes (Rambur)
(Figs. 21, 25, 76)

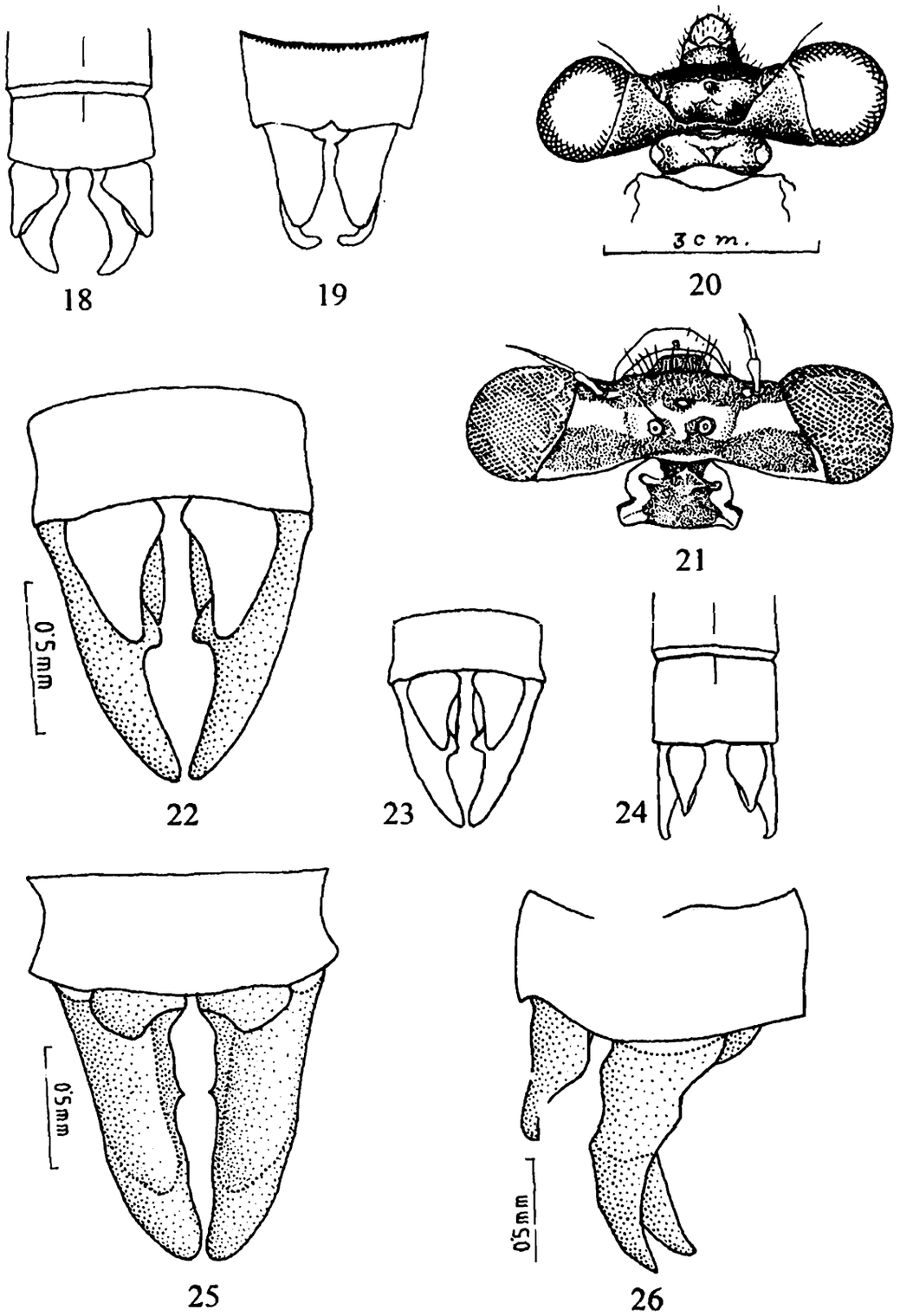
1842. Rambur, *Platycnemis marginipes, Ins. Névrop.*, p. 240.

1890. Kirby, *Copera marginipes, Syn. Cat. Neur. Odon.*, p. 129.

1933. Fraser, *Copera marginipes, Fauna Brit. India, Odon.*, **1** : 192-197.

1954. Lieftinck, *Copera marginipes, Treubia,* **22** (suppl.) : 51-52.

Material examined : Assam: Goalpara, 1 Female, 10.xii.1973; Bihar: Hazaribagh, 2 Female, 29.x.1974; 1 Male, 01.xi.1974; 2 Male, 2 Female, 02.xi.1974; 1 Male, 27.vi.1975; Palamau, 1 Male, 1 Female, 13.vi.1983; Manipur: Morch, 1 Male, 25.xi.1983; Meghalaya: Napakbeel, 1 Male, 12.iv.1973; West Bengal: Calcutta, 1 Male, 20.x.1985; Madhya Pradesh: Chindwara, 1 Female, 23.xi.1971; 1 Male, 1 Female



Figs. 18-26. 18. Dorsal view of 10th abdominal segment and anal appendages of male *Platycnemis dealbata* Selys; 19. Dorsal view of 10th abdominal segment and anal appendages of male *Indocnemis orang* Foerster; 20. Head and prothorax of *Copera vittata assamensis* Laidlaw showing markings on them; 21. Head and prothorax of *Copera marginipes* (Rambur) showing markings on them; 22. Dorsal view of 10th abdominal segment and anal appendages of male *Copera vittata serapica* (Selys); 23. Dorsal view of 10th abdominal segment and anal appendages of male *Copera vittata* (S.L); 24. Dorsal view of 10th abdominal segment and anal appendages of male *Copera superplatypes* Fraser; 25. Dorsal view of 10th abdominal segment and anal appendages of male *Copera marginipes* (Rambur); 26. Left lateral view of 10th abdominal segment and anal appendages of male *Copera ciliata* (Selys)

(copulating pair), 25.xi.1971; 1 Male, 1 Female, 26.xi.1971; 1 Male, 27.xi.1971; Seoni, 2 Female, 3.xii.1971; South Andaman (March to April, 1964) : Cowrighat (7 Male, 5 Female), Katan, Bartang (5 Male), Mannarghat, Wright Myo (2 Male, 1 Female), Rajt Gur (3 Male, 1 Female), Shoal Bay (2 Male, 1 Female), Wrafters Creek (20 Male, 4 Female). Pakistan : Saltrange, Punjab, 1 Male, 22.iv.1931; Saidan Saltrange, 1 Female, 22.iv.1931.

Distribution : INDIA : Bollovumpattis, Coorg, Deccan, Malabar, Nilgiris (Fraser, 1931); Palni Hills (Fraser, 1924 a); Bombay, Mahabaleswar, Poona (Fraser, 1933 a, b); Jalpaiguri, Assam, Margharita (Fraser, 1933 b); Andaman and Nicobar Islands: Andamans (Lahiri, 1998; Ram *et al.*, 2000); Assam (Mitra, 2002 b); Goa (Kulkarni and Talmale (2008 a); Himachal Pradesh (Singh and Prasad, 1974; Kumar and Prasad, 1981; Kumar, 2005); Jharkhand (Bihar): Singbhum (Bhasin, 1953; Mitra, 2002 b); Karnataka: South Western Karnataka (Subramanian *et al.*, 2008); Kerala (Emiliyamma *et al.*, 2007), Silent valley (Rao and Lahiri, 1982); Madhya Pradesh (Bhasin, 1953; Mitra, 1988; Mishra, 2007), Sagar (Srivastava and Suribabu, 1997); Maharashtra (Prasad, 1996 b; Kulkarni and Talmale, 2008 b; Babu and Nandy, 2010), Pench National Park (Kalaskar and Kalaskar, 1998), Melghat Tiger Reserve, Tadoba Andhari Tiger Reserve, Sanjay Gąndhi National Park (Kulkarni and Prasad, 2005; Kulkarni *et al.*, 2006 a and b); Manipur (Mitra, 2002 b); Meghalaya (Lahiri, 1987; Mitra, 1999); Mizoram (Prasad, 2007 b); Pondicherry (Emiliyamma and Radhakrishnan, 2006 a); Rajasthan (Prasad and Thakur, 1981); Tamil Nadu (Emiliyamma, 2009); Uttarakhand: Dehra Dun (Singh and Prasad, 1974); Garhwal Hills (Prasad, 1974); West Bengal (Srivastava and Sinha, 1993; Mitra, 2002 b).

Elsewhere : China (Needham, 1930; Tsuda, 1991 and 2000); Mallaca (Selys, 1891); Malaysia (Brooks, 1981; Lieftinck, 1954; Selys, 1891); Myanmar (Bhasin, 1953; Lieftinck, 1948; Selys, 1891); Nepal (St. Quentin, 1970); Sri Lanka (Fraser, 1933 a, b; Lieftinick, 1971); Thailand (Kiauta and Kiauta, 1983 b); Taiwan (Lieftinck *et al.*, 1984); Bangladesh, Hong Kong, Indonesia, Singapore, Vietnam (Tsuda, 1991 and 2000); Pakistan (Mitra and Babu, 2009).

Intraspecific variations : The Meghalaya specimen varies from the description provided by Fraser (1933 b) in having segments 3-6 of abdomen with middorsal carinal lines and segments 6 and 7 with small blue baso-lateral paired spot; on the contrary specimens from Bihar (Hazaribagh), Assam, Calcutta and Madhya Pradesh agree with the description provided by Fraser (1933 b); but in specimens from Seoni, the *arc* is more distal to the distal antenodal nervure, than those in the specimens from Chhindwara. The male superior anal appendages of the Andaman specimens looks obtusely triangular when viewed from dorsum; but viewed in dorso-lateral angle the apex of the organ appears strongly bent inwords.

Copera superplatypes Fraser
(Fig. 24)

1927. Fraser, *Copera superplatypes, Rec. Indian Mus.*, **29** : 88-89.

1933. Fraser, *Copera superplatypes, Fauna Brit. India, Odon.*, **1** : 206-208.

2000. Tsuda, *Copera superplatypes, A distributional list of World Odonata,* p. 53.

Material examined : Nagaland: Dimapur, Karbianglong, 1B&, 19.iii.1997.

Distribution : INDIA : Hasimara, Duars of Bengal (Fraser, 1933 b); Nagaland (Mitra *et al.*, 2002).

Elsewhere : Bangladesh (Tsuda, 2000).

Remarks : Mitra *et al.* (2002) reported 'Selys' as the discoverer of the species. But it was a careless mistake and for which Mitra is responsible. Hence Mitra apologizes for the mistake.

Copera ciliata (Selys)
(Fig. 26)

1863. Selys, *Psilocnemis annulata, Bull. Acad. Belg.*, (2) **16** : 172.

1863. Selys, *Psilocnemis ciliata, Acad. Belg.*, (2) **16** : 173.

1886. Selys, *Psilocnemis subannulata, Mem. Cour. Acad. Belg.*, **38** : 125-126.

1890. Kirby, *Copera annulata, Syn. Cat. Neur. Odon.*, p. 129.

1907. Laidlaw, *Copera ciliata,* Fasc. *Malayenses, Zool. 4, Odon.*, **2** : 8.

1933. Fraser, *Copera annulata, Fauna Brit. India, Odon.*, **1** : 203-206.

1984. Davies and Tobin, *Copera ciliata, The Dragonflies of the World,* **1** : 101.

1991. Tsuda, *Copera ciliata, A distributional list of World Odonata,* p. 52.

Material examined : Manipur : Moirang, 1 Male, 19.iii.1974; Meghalaya : Chitmaring beel, 4 Male, 2 Female, 10.iv.1973; West Bengal : Calcutta, 1 Male, 1 Female, 11.iii.1967.

Distribution : INDIA : Nicobar (Laidlaw, 1917); North Lakimpur (Laidlaw, 1914); Assam, Bengal (Fraser, 1933 a, b; Laidlaw, 1917); Gujarat (Prasad, 2004); Himachal Pradesh (Kumar and Prasad, 1981; Kumar, 2005); Manipur (Lahiri, 1977 b); Maharashtra : Melghat Tiger Reserve, Sanjay Gandhi National Park (Kulkarni and Prasad, 2005; Kulkarni *et al.*, 2006 b); Meghalaya (Lahiri, 1987; Mitra, 1999); West Bengal (Srivastava and Sinha, 1993), Calcutta (Mitra, 1983).

Elsewhere : China (Rowe, 1981); Indo-China, Japan (Fraser, 1933 a, b); Sumatra (Laidlaw, 1917); Taiwan (Leiftinck *et al.*, 1984); Thailand (Kiauta and Kiauta, 1983 b); Bangladesh, Hong Kong, Malaysia, Myanmar, Vietnam (Tsuda, 1991 and 2000).

Intraspecific variations : Only the male specimens from Calcutta differs from the description provided by Fraser (1933 b) in having faintly brown labium, frons and vertex bluish-yellow, distal ends of femora slightly darker than the ground colour in males, while in female the bluish-yellow regions are replaced by pale blue-colour. The Meghalaya males differ from the description present in the *Fauna of British India, Odonata*, Volume 1, in having postclypeus broadly black, its lateral edges blue; abdominal segments 9 and 10 black, but in females these are unmarked.

Remarks on nomenclature by Lahiri : Lahiri (1987) without citing any reason used the old name *Copera annulata*. *Copera annulata* (Selys) is distributed in China, Japan, Korea; but *C. ciliata* occurs in Bangladesh, China, Hong Kong, Indonesia, India, Cambodia, Laos, Myanmar, Malaysia, Taiwan, Thailand, Vietnam. Lahiri (*op cit*) mixed up the distribution without studying the distribution of the two species. Even what has been mentioned above needs revision because Fraser's (1933 b) contention has been cited.

Family COENAGRIONIDAE Tillyard

1865. Selys, *Agrion, 5^me Legion, Bull. Acad. Belg.*, (2) **20** : 377.

1890. Kirby, *Coenagrioninae, Syn. Cat. Odon.*, p. 119.

1926. Tillyard, *Coenagrionidae, Insects Aust. New Zeal.*, 76-77.

1933. Fraser, *Coenagriinae, Fauna Brit. India, Odon.*, **1** : 272.

1957. Fraser, *Coenagriidae, A Reclassification of the Order Odonata*, p. 47.

The family Coenagrionidae is most successful one in the whole suborder Zygoptera. Species of the family present very much identical venation but wider differences in their general appearances, although they have similar behaviour resting with their wings closely apposed over the dorsum of the thorax. Nodus at about one-third the wing length from base, never as little as one fourth. Pterostigma always short, usually covering only one cell, more rarely two, sometimes less than one cell's length, variable in shape but mostly rhomboidal or trapezoidal. Transverse series of cross-veins distal to level of nodus nearly complete in all cases; only interruptions due to zigzagging of the distal portions of *MA* and *IA*; sometimes IR_3. Postnodals vary from 5 to 20. IR_3 and R_{4+5} arise almost close to the subnode; IR_2 and IR_3 are separated by one or more cells. Cu_2 and *IA* well developed; distal side of the discoidal cell acute; subdiscoidal cell complete. Anal appendages extremely variable.

Habit : Breeds in both still and running water, preferably the former, nymphs with short, flat labial mask, the medium lobe entire, lateral lobes with setae and with the teeth confined, caudal gills shape varies; the branch of trachea never at right angle to the main trunk.

Distribution : Both Old and New World.

KEY TO GENERA OF THE FAMILY COENAGRIONIDAE

1. Arc situated distal to the distal antenodal nervure 2

– Arc situated at the level of the distal antenodal nervure 3

2. Larger species with abdomen nearly 30 mm and 10-12 postnodal nervure in fore-wings; colours bright red and yellow in the subadults; black marked with blue in full adults; medio-anal link angulated ..... *Argiocnemis* Selys

– Smaller species with abdomen 20 mm or less; 6-8 postnodals, colour variable from species to species, medio-anal link variable from angulated to straight line ..... *Agriocnemis* Selys- *Mortonagrion* Fraser Complex

3. The nervure *ab* and *ac* originates from the same point on the hind border of the wing, proximal to the arc 4

– The point of origin of *ab* is proximal to the origin of *ac* 6

4. A distinct ridge on the frons; postocular coloured spots absent on the back of the head, black marking absent on the head and thorax ..... *Ceriagrion* Selys

– No ridge on frons, postocular coloured spots always present, head and thorax marked with black or dark colour 5

5. Head may or may not be with triangular postocular spots; pterostigma of fore and hind-wings are of the same size; abdomen not unduly elongated, female without any spine on the 8th abdominal segment ..... *Pseudogrion* Selys

– Head with a triangular postocular coloured spot; pterostigma of fore-wings larger than that of hind-wings; female with a spine on the ventral side of the segment 8 of abdomen ..... *Aciagrion* Selys

6. Pterostigma in male varies in shape and size in fore and hind-wings, the discoidal cell with costal side half the length of the posterior side in fore-wings and two-thirds the length of that side in the hind, basal side about one and half times the length of costal in fore-wings, less than half the length in the hind-wings; distal side is very oblique; males with tubercles on the apical border of the segment 10; female with a spine on ventral side of the segment 8 ..... *Ischnura* Charpentier – *Rhodischnura* Fraser, Complex

– Pterostigma same colour and shape in fore and hind-wings of male; discoidal cell with costal side less than half the length of the posterior in fore and about half the length in the hind-wings; basal side of the same length or only two-third the length in the hind-wings 7

7 *Ac* midway between the antenodals, postocular spot always present 8

– *Ac* near the level of the proximal antenodal, postocular coloured spot absent.. ..... *Onychargia* Selys

8. Segment 10 longer than anal appendages ..... *Enallagma* Charpentier

– Segment 10 nearly equal to anal appendages ..... *Paracercion* Weekers and Dumont

Genus ***Pseudagrion*** Selys

1876. Selys, *Pseudagrion, Bull. Acad. Belg.*, (2) **42** : 490.

1933. Fraser, *Pseudagrion, Fauna Brit. India, Odon.*, **1** : 274.

1991. Tsuda, *Pseudagrion, A distributional list of World Odonata,* p. 43.

Diagnostic characters: It is recognized as the largest modern genus of the Order Odonata. Ris, Pinhey, Balinsky and Chutter made several attempts to split the genus into groups; but every attempt appeared artificial.

Head narrow, usually bearing postocular spot, in some species postocular spot may be absent. Thorax slender, posterior lobe of prothorax of female with two small hooks or spines sloping towards on the dorsum of middle lobe. Abdomen cylindrical, not nearly twice the length of the hind-wing. Legs short, tibial spines 4 to 7 on the hind pair. Wings hyaline, pterostigma lozenge shaped, oblique but especially so at distal extremity, braced covering less than one cell; postnodals 8 to 15 in fore-wings, and usualliy 10; in hind-wings the postnodals vary from 8 to 12, usually 9; discoidal cell acutely pointed at the distal end, with costal side less than half the length of the posterior in fore-wing, basal side shorter than the costal in hind-wing, basal side equal to the costal in the fore-wing, distal side is very oblique. Sectors of *arc* arising from the lower end of the *arc*, divergent from origins; *arc* situated at the level of the distal antenodal nervure; *ab* always present, and complete arising at the point where *ac* meets the hinder border of the wings and continued on as *IA*, but an angulations at the junction of the two. R_{4+5} arises well before the nervure descending from the subnode; IR_3 at the level and in continuation of that nervure; the position of *ac* is variable, but nearer the proximal antenodal nervure. Abdominal segments 8 to 10 becoming progressively shorter. Anal appendages variable, is long and shorter than segment 10, the inferiors shorter, superiors frequently forked or notched at apex and with or without spines at base, inferiors simple, conical.

Genitalia : Lamina narrowly and deeply cleft; hamules broad quadrate plates meeting across the middle line, lobe small, depressed; penis with broad apex, the end curled over the dorsum and bifid embraces the stem of the organ; vulvar scales moderately robust, no basal spine present on segment 8 of the female.

Type Species : According to Fraser (1933 b) *Pseudagrion furcigerum* (Rambur, 1842) is the type-species of the genus. But Pinhey (1964) and Davis and Tobin (1984) reported *Pseudagrion caffrum* (Burmeister, 1839) as the Type-Species of the genus.

Distribution : Mainly Ethiopian but with many Palaearctic, Oriental and Australian species.

Elsewhere : Angola, Australia, Bangladesh, Cameroon, Celebes, China, India, Ivory Coast, Java, Luzon, Madagascar, Marques Is., Mayotte Is., Myanmar (Burma), Nepal, Natal, Nigeria, Pakistan, Palestine, Papua, Philippines, Senegal, Siberia, Sierra Leone, Solomon Is., Sunda Is., Syria, Sri Lanka (Ceylon), Timor, Transvaal, Upper Congo, West Africa, Zambia, Zambezi, Zimbabwe.

KEY TO SPECIES OF GENUS *PSEUDAGRION* SELYS

1. Male abdomen 27 mm; female abdomen 29 mm; male hind-wing 17 mm; female hind-wing 20 mm ..... *P. microcephalum* (Rambur)

2. Male abdomen 25 mm; female abdomen 27 mm; male hind-wing 17 mm; female hind-wing 20 mm ..... *P. andamanicum* Fraser

3. Male abdomen 30-32 mm; female abdomen 29 mm; male hind-wing 20-24 mm; female hind-wing 20 mm ..... *P. australasiae* Laidlaw

4. Male abdomen 30-32 mm; female abdomen 31 mm; male hind-wing 20 mm; female hind-wing 22 mm .....*P. malabaricum* Fraser

5. Male abdomen 28-30 mm; female abdomen 31 mm; male hind-wing 18-20 mm; female hind-wing 20 mm .....*P. decorum* (Rambur)

6. Male abdomen 23-24 mm; female abdomen 23 mm; male hind-wing 18-20 mm; female hind-wing 15-16 mm .....*P. hypermelas* Selys

7 Male abdomen 22-24 mm; female abdomen 23-24 mm; male hind-wing 15 mm; female hind-wing 16 mm ..... *P. spencei* Fraser

8. Male abdomen 25 mm; female abdomen 25 mm; male hind-wing 16 mm; female hind-wing 16 mm .....*P. laidlawi* Fraser

9. Male abdomen 29 mm; female abdomen 29 mm; male hind-wing 18-20 mm; female hind-wing 21 mm .....*P. rubriceps rubriceps* Selys

10. Male abdomen 23 mm; female abdomen 25 mm; male hind-wing 18 mm; female hind-wing 17 mm .....*P. williamsoni* Fraser

11. Male abdomen 37 mm; female abdomen 32 mm; male hind-wing 25 mm; female hind-wing 24 mm .....*P. pruinosum* Burmeister

Pseudagrion australasiae Selys
(Figs. 27, 28)

1876. Selys, *Pseudagrion microcephalum* race? *australasiae, Bull. Acad. Belg.*, (2) **42** : 491, 506.

1916. Laidlaw, *Pseudagrion australasiae, Rec. Indian Mus.*, **12** : 21-23.

1919. Laidlaw, *Pseudagrion bengalense, Rec. Indian Mus.*, **16** : 192-193.

1933. Fraser, *Pseudagrion bengalense, Fauna Brit. India, Odon.*, **1** : 282-284.

1954. Lieftinck, *Pseudagrion australasiae, Treubia*, **22** (suppl.) : 56.

1991. Tsuda, *Pseudagrion australasiae, A distributional list of World Odonata*, p. 43.

Material examined : Manipur: Fagakchaokhiai, 1 Male, 19.iii.1974; Nagaland: Zunheboto, 1 Male, 17.vii.1991; West Bengal: 24 Parganas, 1 Male, 12.x.1974; Meghalaya: Wageasai, 1 Male, 07.iv.1973.

Distribution : INDIA : Arunachal Pradesh (Ram and Prasad, 1999; Mitra, 2002 b); Assam, Bengal (Fraser, 1933 b); Chhattisgarh : Bastar (Prasad, 1996 a); Manipur (Lahiri, 1977 b); Meghalaya (Lahiri, 1987; Mitra, 1999); Nagaland (Mitra *et al.*, 2006); Tripura (Srivastava and Sinha, 2000); West Bengal (Srivastava and Sinha, 1993), Calcutta (Kolkata) (Laidlaw, 1919), Howrah (Dasgupta, 1957; Ram *et al.*, 1982).

Elsewhere : Australia (Laidlaw, 1916 a); Myanmar (Fraser, 1933 b); Bangladesh, Indonesia, Kampuchea, Malaysia, Nepal, Singapore, Thailand (Tsuda, 1991 and 2000).

Intraspecific variation : The specimen from Manipur has got a goblet shaped mark on segment 2 which is absent in West Bengal specimen. The Meghalaya specimen varies from the description provided by Fraser (1933 b) in the *Fauna of British India* due to its longer hind-wing (figure given in the *Fauna of British India*, differs from the specimen studied).

Pseudagrion microcephalum (Rambur)
(Fig. 29)

1842. Rambur, *Agrion microcephalum, Ins. Névrop.*, p. 259.

1876. Selys, *Pseudagrion microcephalum, Bull. Acad. Belg.*, (2) **42** : 504.

1933. Fraser, *Pseudagrion microcephalum, Fauna Brit. India, Odon.*, **1** : 278-280.

1954. Lieftinck, *Pseudagrion microcephalum, Treubia,* **22** (suppl.) : 57.

Material examined : West Bengal : Calcutta 2 Male, 20.xi.1966; Hooghly, 1 Male, 1 Female, 24.xi.1975; Howrah, 1 Male, 29.xi.1966. Nicobar: Trinket Island, 1 Male, 17.ii.1993. Pakistan : Sind, 1 Female, —.xi.1927.

Distribution : INDIA : Bombay (Selys, 1891); Chilka Lake (Fraser and Dover, 1922; Laidlaw, 1915); Hosangabad, Panchmari, Satpura Hills (Fraser, 1919 a); Nilgiris, Wyanad, Ootacamund (Fraser, 1924 a); Cochin, Coorg, Deccan, Kanara, Malabar (Fraser, 1931); Andaman and Nicobar Islands: Middle Nicobar (Ram *et al.*, 2000); Assam (Brahmaputra valley) (Lahiri, 1979); Goa (Prasad, 1995); Karnataka: South Western Karnataka (Subramanian *et al.*, 2008); Kerala (Emiliyamma *et al.*, 2007); Madhya Pradesh (Mishra, 2007), Sagar (Srivastava and Suri Babu, 1997); Maharashtra (Babu and Nandy, 2010), Melghat Tiger Reserve (Kulkarni and Prasad, 2005; Kulkarni *et al.*, 2002); Manipur (Srivastava and Sinha, 2004); Tamil Nadu (Emiliyamma, 2009); Uttar Pradesh (Ram *et al.*, 1983); West Bengal (Srivastava and Sinha, 1993), Howrah, Hooghly (Ram *et al.*, 1982).

Elsewhere : Australia, Bangladesh, China, Hong Kong, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, New Hebrides, Papua New Guinea, Philippines, Singapore, Solomon Islands, Sri Lanka, Taiwan, Thailand, Vietnam (Tsuda, 1991 and 2000); Pakistan (Mitra and Babu, 2009).

Pseudagrion malabaricum Fraser
(Fig. 30)

1924. Fraser, *Pseudagrion malabaricum, Rec. Indian Mus.*, **26** : 428, 494-495.

1933. Fraser, *Pseudagrion malabaricum, Fauna Brit. India, Odon.*, **1** : 284-286.

1983. Mitra, *Pseudagrion malabaricum, Ent. Mon. Mag.*, **119** : 29.

Material examined : West Bengal: Calcutta, 1 Female, 05.iii.1967.

Distribution : INDIA : Kodaikanal, Palni Hills (Fraser, 1924 a and 1931; Kimmins, 1966); Coorg, Malabar, Nilgiris (Fraser, 1931); Andhra Pradesh (Prasad, 2007 a); Goa (Prasad, 1995); Jharkhand (Bihar) (Prasad and Varshney, 1988); Kerala (Emiliyamma

et al., 2007), New Amarambalam Reserve Forests (Rao and Lahiri, 1982); Tamil Nadu (Emiliyamma, 2009); West Bengal: Calcutta (Mitra, 1983), Jalpaiguri (Srivastava and Sinha, 1993).

Elsewhere : Sri Lanka (Lieftinck, 1971; Tsuda, 2000).

Intraspecific variation : The specimen varies from Fraser's (1933 b) description in having labrum, postclypeus and frons bluish yellow; marks on prothorax yellow.

Pseudagrion decorum (Rambur)
(Fig. 31)

1842. Rambur, *Agrion decorum, Ins. Névrop.*, p. 258.

1876. Selys, *Pseudagrion decorum, Bull. Acad. Belg.*, (2) **42** : 504.

1933. Fraser, *Pseudagrion decorum, Fauna Brit. India, Odon.*, **1** : 286-289.

Material examined : Maharashtra: Bhandara 1 Male, 24.x.1971; 2 Male, 29.x.1971; Orissa: Sundergarh, 1 Male, 17.ix.1971; West Bengal: Birbhum, 1 Male, 18.ix.1974; Calcutta, 1 Male, 06.viii.1967; Howrah, 1 Female, 06.x.1974; 24 Parganas, 1 Male, 24.iii.1973. Pakistan : Sind, 1 Male, 25.xi.1927.

Distribution : INDIA : Calcutta, Puri (Laidlaw, 1916 a); Cochin, Coorg, Deccan, Kanara, Malabar, Nilgiris (Fraser, 1931); Dehra Dun, Lachiwala, Mothronwala (Bhasin, 1953); Andhra Pradesh (Prasad, 2007 a); Bihar (Prasad and Varshney, 1988); Chhattisgarh: Bastar (Prasad, 1996 a); Gujarat (Prasad, 2004); Himachal Pradesh (Kumar and Prasad, 1981); Kerala (Emiliyamma *et al.*, 2007); Madhya Pradesh (Mishra, 2007), Sagar (Srivastava and Suri Babu, 1997); Maharashtra (Prasad, 1996 b; Kulkarni and Talmale, 2008 b; Babu and Nandy, 2010); Mizoram (Prasad, 2007 b); Orissa (Mitra, 2002 b); Tamil Nadu (Emiliyamma, 2009); Uttarakhand (Prasad and Mondal, 2010), Dehra Dun (Mitra, 2000); West Bengal (Srivastava and Sinha, 1993), Midinapore (Dasgupta, 1957), Howrah, 24 Parganas of West Bengal (Ram *et al.*, 1982).

Elsewhere : Nepal (St. Quentin, 1970); Bangladesh, Hong Kong, Myanmar, Nepal, Pakistan, Sri Lanka (Tsuda, 1991 and 2000).

Intraspecific variations: Specimens from eastern India agree with the description provided by Fraser (1933 b); but males from Maharashtra appeared more olivaceous than males from eastern India. Pakistan specimen agree with the description in the *Fauna of British India.*

Pseudagrion laidlawi Fraser
(Fig. 32)

1922. Fraser, *Pseudagrion laidlawi, Mem. Dept. Agric. India (Ent.)*, 7 (7) : 48-50.

1933. Fraser, *Pseudagrion laidlawi, Fauna Brit. India, Odon.*, **1** : 294-296.

Material examined : (Pakistan) Sind : Bubak, 1 Male, 25.xi.1927; Shah Hasan, 1 Male, 25.xi.1927; Kallar Kahar Salt Range (Pakistan), 1 Male, 20-23.x.1930.

Distribution : INDIA : Gujarat (Prasad, 2004); Uttarakhand (Kumar and Prasad, 1981), Dehra Dun (Mitra, 2000).

Elsewhere : *"Throughout Lower Sind and probably, also, the dry areas of neighbouring states; moderately common at Karachi, where I found it breeding in water channels in the municipal sewage firm"* (Fraser, 1933 b). Bangladesh, Iran, Pakistan (Tsuda, 2000).

Remarks : We have doubt about its occurrence in Bangladesh, since the species is a typical desert form, and Bangladesh is made up of Ganga alluvium and there is no trace of aridity in that country. Regarding the type material Kimmins (1966) pointed out "*Type Originally stated to be in Fraser's collection and later (1933b ; 296) in BM (NH) has not yet been traced*"

Pseudagrion williamsoni Fraser
(Fig. 33)

1922 Fraser, *Pseudagrion williamsoni, Mem. Dept. Agric. India,* (*Ent.*), 7 (7): 46-47.

1933 Fraser, *Pseudagrion williamsoni, Fauna Brit. India, Odon.*, **1** : 300-302.

Material examined : Nicobar, South Bay, 1 Male, 27.v.1984.

Distribution : INDIA : Great Nicobar (Mitra, 1995 a).

Elsewhere : Myanmar, Kampuchea, Thailand (Tsuda, 2000). Fraser (1933 b) cited Lower Burma only, King Island, Mergui.

Pseudagrion hypermelas Selys
(Fig. 34)

1876. Selys, *Pseudagrion hypermelas, Bull. Acad. Belg.*, (2) **42** : 519.

1907. Mortan, *Pseudagrion bidentatum, Trans. Ent. Soc. Lond.*, p. 307.

1933. Fraser, *Pseudagrion hypermelas, Fauna Brit. India, Odon.*, **1** : 289-292.

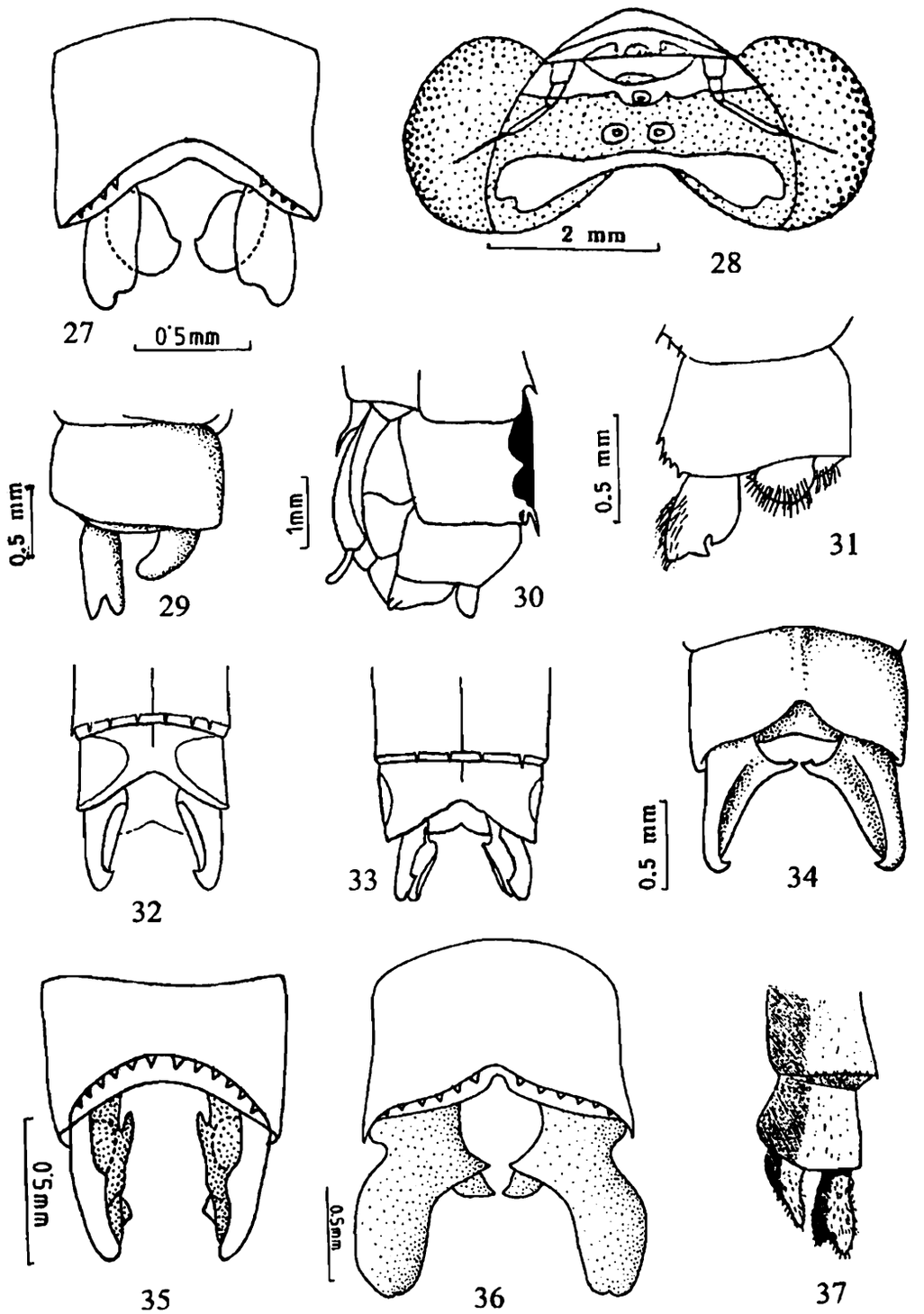
1991. Tsuda, *Pseudagrion hypermelas, A distributional list of World Odonata*, p. 44.

Material examined : West Bengal: Calcutta, 1 Male, 21.vii.1974. Pakistan : Punjab : Sadan Shah Saltrange, 5 Male, 1 Female, 1.iv.1931; Khewra Saltrange, 1 Female, 24.ix.-x.1930; Choa: Sadan Shah Saltrange Gandhala Nalla, 1 Male, 26.iv.1931.

Distribution : INDIA : Bihar, Kierpur (Laidlaw, 1919); Hosangabad (Fraser, 1919 a); Mahabaleswar, Poona (Fraser, 1924 a); Punjab (Fraser, 1933 b); Bengal, Buxa (Bhasin, 1953); Chhattisgarh: Bastar (Prasad, 1996 a); Gujarat (Prasad, 2004); Jharkhand (Bihar): Hazaribagh (Prasad and Varshney, 1988); Madhya Pradesh (Mishra, 2007), Sagar (Srivastava and Suri Babu, 1997); Maharashtra (Prasad, 1996 b; Babu and Nandy, 2010); West Bengal (Srivastava and Sinha, 1993; Mitra, 2002 b).

Elsewhere : Pakistan (Khaliq and Yousuf, 1993 a; Tsuda, 2000).

Intraspecific variation : The specimen from Calcutta differs from the description in the *Fauna of British India* in having citron-yellow labium, orange coloured bases of mandibles. Pakistan specimens agree with the description in the *Fauna of British India*.



Figs. 27-37. 27. Dorsal view of 10th abdominal segment and anal appendages of male *Pseudagrion australasiae* Selys; 28. Markings on head of *Pseudagrion australasiae* Selys; 29. Right lateral view of 10th abdominal segment and anal appendages of male *Pseudagrion microcephalum* (Rambur); 30. End part of the abdomen, anal appendages and genitalia of female *Pseudagrion malabaricum* Fraser; 31. Right lateral view of 10th abdominal segment and anal appendages of male *Pseudagrion decorum* (Rambur); 32. Dorsal view of 10th abdominal segment and anal appendages of male *Pseudagrion laidlawi* Fraser; 33. Dorsal view of 10th abdominal segment and anal appendages of male *Pseudagrion williamsoni* Fraser; 34. Dorsal view of 10th abdominal segment and anal appendages of male *Pseudagrion hypermelas* Selys; 35. Dorsal view of 10th abdominal segment and anal appendages of male *Pseudagrion rubriceps rubriceps* Selys; 36. Dorsal view of 10th abdominal segment and anal appendages of male *Pseudagrion spencei* Fraser; 37. Left lateral view of 10th abdominal segment and anal appendages of male *Pseudagrion? andamanicum* Fraser

Pseudagrion pruinosum (ssp.)

1839. Burmeister, *Agrion pruinosum, Handb. Ent.*, **2** : 821.

1876. Selys, *Pseudagrion pruinosum, Bull. Acad. Belg.*, (2) **41**: 517.

1933. Fraser, *Pseudagrion pruinosum, Fauna Brit. India, Odon.*, **1** : 305-306.

1954. Lieftinck, *Pseudagrion pruinosum pruinosum, Treubia,* **22** (suppl.) : 59.

1995. Mitra, *Pseudagrion pruinosum,* (ssp), *Opusc. zool. flumin.*, **129** : 2.

Material examined : Nicobar: South Bay, 1 Female, 27.vi.1984.

Distribution : INDIA : Andaman and Nicobar Islands: Great Nicobar (Mitra, 1995 a; Ram *et al.*, 2000).

Elsewhere : Indonesia (Lieftinck, 1954; Tsuda, 2000), Vietnam (Cuong and Hoa, 2007).

Remarks : The specimen agrees with the description present in the *Fauna of British India*. Fraser (1933 b) cited *P. pruinosum* occurs in Burma to Indonesia. But Tsuda (2000) cited Indonesia and India. In Tsuda (1991) it is found that Dr. Tsuda mentioned only Indonesia; it is therefore, conjectured that Dr. Tsuda might have recorded the subspecies from Mitra (1995 a). It is interesting to note that Tsuda (1991 and 2000) has not recorded any population of *Pseudagrion pruinosum* subsp. from Burma (Myanmar) as was believed by Fraser (1933 b). *It is, therefore, concluded that the population of the Nicobars Island reported here is P. pruinosum pruinosum* (Burmeister), since the fauna of Nicobar Island is closely related to the fauna of Indonesia.

Pseudagrion rubriceps rubriceps Selys
(Fig. 35)

1876. Selys, *Pseudagrion rubriceps, Bull. Acad. Belg.*, (2) **42** : 510.

1933. Fraser, *Pseudagrion rubriceps, Fauna Brit. India, Odon.*, **1** : 296-299.

1954. Lieftinck, *Pseudagrion rubriceps rubriceps, Treubia,* **22** (suppl.) : 60.

1991. Tsuda, *Pseudagrion rubriceps rubriceps, A distributional list of World Odonata*, p. 46.

Material examined : Assam : Goalpara, 1 Male, 25.v.1973; Bihar: Hazaribagh, 1 Male, 29.vi.1975; 1 Male, 1 Female (cop.), 29.x.1974; 1 Male, 1 Female, 31.x.1974; Orissa: Bolangiri, 1 Female, 17.xi.1972; Tripura: Agartala, 1 Male, 29.x.1974; Udaipur, 1 Male, 7.xi.1974; West Bengal: Calcutta, 1 Male, 1 Female, 21.vii.1974; 1 Male, 1 Female, 20.xi.1966; 1 Male, 1 Female, 29.i.1976; Howrah, 1 Male, 22.i.1977; Meghalaya: Bangsi, 1 Male, 05.iv.1973; Charikuty, 1 Female, 04.xi.1973; Rongtham River bank, 2 Male, 11.iv.1973; Rangrengiri, 1 Male, 20.iv.1973; Sangsok, 1 Male, 1 Female, 15.iv.1973; Wagesi, 2 Male, 2 Female, 05-08.iv.1973; Shillong, 1 Male, 09.x.1974; 6 Male, 1 Female, 13.x.1974; Madhya Pradesh: Multai (Betul dist.) 1 Female, 12.xi.1971; Chhindwara, 1 Male, 26.xi.1971.

Distribution : INDIA : Nagpur (Laidlaw, 1919); Poona (Fraser, 1924 a); Bollovumpattis, Cochin, Coorg, Deccan, Kanara, Malabar, Nilgiris (Fraser, 1931); Dehra Dun, Lachiwala, Mothronwala, Nalapani, Raipur (Bhasin, 1953); Assam (Lahiri, 1979); Chandigarh (Tyagi, 1984); Chhattisgarh: Bastar (Prasad, 1996 a); Gujarat (Prasad, 2004); Himachal Pradesh (Kumar, 2005), Simbalbara Wildlife Sanctuary (Babu and Mehta, 2009); Jharkhand (Bihar) (Prasad and Varshney, 1988; Mitra, 2002 b); Karnataka: Biligiri Rangaswamy Temple Wildlife Sanctuary (Emiliyamma and Radhakrishnan, 2006 b); Kerala (Emiliyamma *et al.*, 2007); Madhya Pradesh (Mishra, 2007); Maharashtra (Prasad, 1996 b; Kulkarni and Prasad, 2005; Kulkarni and Talmale, 2008 b; Kulkarni *et al.*, 2006 a; Babu and Nandy, 2010); Meghalaya (Lahiri, 1987; Mitra, 1999); Orissa (Mitra, 2002 b), Punjab Shivalik (Sharma and Kumar, 2008); Rajasthan (Prasad and Thakur, 1981); Tamil Nadu (Kumar, 1990; Emiliyamma, 2009); Tripura (Srivastava and Sinha, 2000); Uttarakhand: Garhwal Hills (Prasad, 1974), Dehra Dun (Mitra, 2000); Uttar Pradesh (Ram *et al.*, 1983); West Bengal (Srivastava and Sinha, 1993), Calcutta (Mitra, 1983), Howrah, Hooghly (Ram *et al.*, 1982).

Elsewhere : Java (Laidlaw, 1916 a); Myanmar, Palon (Laidlaw, 1916 a; Selys, 1891); Indo-China, Formosa, Malaysia (Fraser, 1933 b); Bangladesh, Hong Kong, Indonesia, Nepal, Pakistan, Philipinnes, Thailand (Tsuda, 1991 and 2000); Bhutan (Mitra, 2008).

Pseudagrion spencei Fraser
(Figs. 36, 77)

1922. Fraser, *Pseudagrion spencei, Mem. Dept. Agric. India, (Ent.)*, **7** : 47-48.

1933. Fraser, *Pseudagrion spencei, Fauna Brit. India, Odon.*, **1** : 292-294.

1966. Kimmins, *Pseudagrion spencei, Bull. Brit. Mus. Nat. Hist. (Ent.)*, **18** : 214.

Material examined : Meghalaya: Bangsi, 2 Male, 15.iv.1973; Wageasi, 6 Male, 5-8.iv.1973; Shillong, 2 Male, 20.xi.1971; Ratachara, 2 Male, 26.viii.1974; West Bengal: Howrah, 1 Male, 26.xii.1976.

Distribution : INDIA : Jalpaiguri (Raja Bhat Khawa) (Fraser, 1933 b); Margharita and Gauhati (Assam) (Fraser, 1933 b); Central Provinces (Fraser, 1933 b); Andhra Pradesh (Prasad, 2007 a); Jharkhand (Bihar) (Prasad and Varshney, 1988); Madhya Pradesh : Sagar (Srivastava and Suri Babu, 1997); Maharashtra : Tadoba Andhari Tiger Reserve (Kulkarni *et al.*, 2006 a); Meghalaya: Shillong (Kimmins, 1966; Lahiri, 1987; Mitra, 1999); Uttar Pradesh (Ram *et al.*, 1983); West Bengal: Midinapore (Dasgupta, 1957), Howrah (Ram *et al.*, 1982).

Elsewhere : Nepal (St. Quentin, 1970); Bangladesh, Hong Kong, Pakistan (Tsuda, 1991 and 2000).

Pseudagrion? andamanicum Fraser
(Fig. 37)

1924. Fraser, *Pseudagrion andamanicum, Rec. Indian Mus.*, **24** : 411-412.

1933. Fraser, *Pseudagrion andamanicum, Fauna Brit. India, Odon.*, **1** : 281-282.

Material examined : Andaman Islands : Viper Island, 1 Male, 1 Female, 28.viii.1928 (terminal abdominal segment missing).

Distribution : INDIA : Andaman and Nicobar Islands (Endemic) (Hämäläinen *et al.*, 1999; Ram *et al.*, 2000).

Remarks: Since marks in the body and other features agree with the description of the species present in the *Fauna of British India,* specimens are identified as ***Pseudagrion andamanicum*** Fraser with reservation.

Pseudagrion indicum Fraser

1924. Fraser, *Pseudagrion indicum, Rec. Indian Mus.*, **26** : 428, 495-497.

1933. Fraser, *Pseudagrion indicum, Fauna Brit. India, Odon.*, **1** : 303-304.

No material could be examined.

Distribution : INDIA : Nilgiris, Coorg, Malabar (Fraser, 1933 b); Western Ghats (Subramanian, 2007); Karnataka: Kudremukh National Park (Emiliyamma and Radhakrishnan, 2007); Kerala (Emiliyamma *et al.*, 2007); Tamil Nadu (Emiliyamma, 2009).

Remarks : D.E. Kimmins (1966) commented, *"indicum (Pseudagrion), 1924: 495-497, figs. 3 i, ii, iv, v. Holotype Male. India, Nilgiri Nadgani, 24.viii.1922, F.C. Fraser. Pseudagrion indicum Fraser Male Type [label F.C.F]. The locality should be Nilgiri, Wyanad, Nadgani. Fraser records types in BM (NH) but only the above specimen was presented before his collection was received here. Fig 127a (1933 b) gives a poor impression of the bifid superior appendage of the male"*

Pseudagrion pilidorsum (Brauer)

1868. Brauer, *Agrion pilidorsum, Verh. zool-bot. Ges. Wein,* **18** : 553-554.

1876. Selys, *Pseudagrion pilidorsum, Bull. Acad. Belg.*, (2) **4** : 514.

1954. Lieftinck, *Pseudagrion pilidorsum pilidorsum, Treubia,* **22** (suppl.) : 58.

1999. Hämäläinen *et al.*, *Pseudagrion pilidorsum, Notul. Odonatol.*, **5** (3) : 28.

No material could be examined.

Distribution : INDIA : Andaman and Nicobar Islands: Middle Andaman (Hämäläinen *et al.*, 1999).

Elsewhere : Philippines (Lieftinck, 1954), China, Japan, Philippines, Taiwan (Tsuda, 2000).

Genus ***Ceriagrion*** Selys

1876. Selys, *Ceriagrion, Bull. Acad. Belg.*, (2) **42** : 525.

1933. Fraser, *Ceriagrion, Fauna Brit. India, Odon.*, **1** : 313.

2000. Tsuda, *Ceriagrion, A distributional list of World Odonata*, p. 27-29.

Remarks : The genus is very closely related to *Pseudagrion* Selys, by the petiolation and structure of the wings; and to the Australian genus *Xiphiagrion* Selys.

Diagnostic characters : Head narrow, distinct frontal ridge, postocular coloured spot absent; thorax long and narrow, prothorax simple without any process. Abdomen cylindrical, slender; legs short, tibial spines short and thick, 4 to 6 or 7 spines in the hind and middle pairs. Wings hyaline, pterostigma narrow oblique at both ends, braced covering about one cell; post nodal nervure numbering 10-12 in fore-wings; discoidal cell acutely pointed at the distal end, with costal side about one-third the length of the posterior side in fore-wing and half the length in the hind-wing; basal side equal to costal side in fore-wing; only half the length in the hind-wing; distal side is very oblique, sectors of *arc* arising from the lower end of the *arc*, divergent from their origins; *arc* situated at the level of the distal antenodal or very slightly distal to that level; *ab* always present and complete, arising at the point where *ac* meets the hinder border of the wing; *ac* situated near the proximal antenodal nervure; *ab* continued on as the nervure *IA*, but an angulation present at the junction of the two; R_{4+5} arising well before the oblique nervure descending from the node; IR_3 in continuation of that nervure (in some cases *ab* arises slightly but distinctly proximal to the level of *ac*).

Genitalia : Lamina narrowly and deeply cleft; hamules quadrate plates slightly hollowed out or curled, meeting across the middle line; lobe long, narrow, flask shaped; penis either blunt or emerginate at apex; its end curled over dorsum and bifid or hollowed out to embrace the stem of penis (Fraser, 1933 b).

Type species : According to Fraser (1933 b) *Ceriagrion coromandelianum* (Fabricius), according to Tsuda (2000) *Ceriagrion cerinorubellum* (Brauer).

Distribution : Old World; Algeria, Angola, Australia, Austria, Bangladesh, Belgium, Benin, Botswana, Burkina Faso, Central Africa, Republic China, Congo, Coted' Ivorie, Egypt, Ethiopia, France, Gabon, Germany, Ghana, Great Britain, Guinea, Guinea-Bissau, Hong Kong, Hungary, India, Indonesia, Italy, Japan, Kampuchea, Kenya, Korea, Lao Peop. Dem. Republic, Liberia, Madagascar, Malaysia, Malawi, Mali, Mauritius, Morocco, Mozambique, Myanmar (Burma), Namibia, Nepal, Netherlands, Niger, Nigeria, Pakistan, Papua-New Guinea, Philippines, Reunion, Senegal, Seychelles, Singapore, Sierra Leone, Solomon Is., Somalia, South Africa, Sudan, Syria, Swaziland, Taiwan, Tanzania, Thailand, Togo, Vietnam, Zaire, Zambia, Zimbabwe.

KEY TO SPECIES OF GENUS *CERIAGRION* SELYS

MALE

1. Male abdomen 26-30 mm 2

\- Male abdomen more than 30 mm 3

2. *Abdomen bright red, sides of segment 1 and ventral surface yellow .... *C. praetermissum* Lieftinck

– Abdomen citron-yellow without any marking ..... *C. coromandelianum* (Fabricius)

– Abdomen bright reddish-orange without any marking, paling to yellow beneath ..... *C. rubiae* Laidlaw

– Abdomen uniform rich vermilion or orange ..... *C. erubescens* Selys

3. Abdomen pale azure blue, segments 9 and 10 marked with black on dorsum .... *C. azureum* (Selys)

– Abdomen dull olivaceous ..... *C. olivaceum* Laidlaw

– Abdomen bright red at base and anal segments, black in between segments .... *C. cerinorubellum* (Brauer)

– Abdomen pale citron-yellow withblack markings on the end segments .... *C. fallax cerinomelas* Lieftinck

* Male specimen not examined.

FEMALE

1. Hind-wing not more than 20 mm 2

– Hind-wing more than 20 mm 3

2. Thorax golden-olivaceous brown, thinly pruinosed; abdomen olivaceous with golden-brown tint on dorsum ..... *C. coromandelianum* (Fabricius)

– Thorax olivaceous, with a golden sheen on dorsum and paling to yellow laterally; abdomen yellow, with slight reddish tint from segment 5 .... *C. praetermissum* Lieftinck

– Thorax and abdomen olivaceous, the former pruinosed white beneath and first two abdominal segments pruinosed white on ventral surface .... *C. rubiae* Laidlaw

– Thorax olivaceous yellow; abdomen reddish-brown on dorsum, deepening on the hinder segments and paling to a greenish-yellow on the sides of segments 1 and 2 ..... *C. erubescens* Selys

3. Dorsum of thorax dark olivaceous, with a golden sheen; undersurface of thorax pruinosed white; abdominal segments 1-2 pruinosed under surface..... ..... *C. fallax cerinomelas* Lieftinck

– Dorsum of thorax pale olivaceous, whitish beneath, abdomen olivaceous brown paling to yellowish beneath ..... *C. olivaceum* Laidlaw

– Dorsum of thorax suffused with golden brown, undersurface pruinosed in adults, abdominal end segments dull brown ..... *C. cerinorubellum* (Brauer)

– Thorax and abdomen blue ..... *C. azureum* (Selys)

Ceriagrion praetermissum Lieftinck
(Fig. 38)

1927. Lieftinck, *Ceriagrion praetermissum, Tijdschr. Ent.*, **70** : 88, 91.

1933. Fraser, *Ceriagrion praetermissum, Fauna Brit. India, Odon.*, **1** : 319-321.

2000. Tsuda, *Ceriagrion praetermissum, A distributional list of World Odonata*, p. 29.

Material examined : Manipur : Morch, 1 Female, 25.xi.1983; Nagaland: Dimapur, 2 Female, 17.ix.1994.

Distribution : INDIA : Manipur (Mitra, 2002 b); Nagaland (Mitra, 2002 b; Mitra *et al.*, 2002).

Elsewhere : Lower Burma (Fraser, 1933 b); Indonesia, Myanmar, Thailand (Tsuda, 2000).

Ceriagrion fallax cerinomelas Lieftinck
(Fig. 39)

1891. Selys, *Ceriagrion melanurum, Ann. Mus. Civ. Genova*, (2) **10** (30) : 517.

1914. Ris *Ceriagrion fallax, Ent. Mitteil.*, **3** (2) : 47-48.

1927. Lieftinck, *Ceriagrion cerinomelas, Tijdschr. Ent.*, **70** : 88-90.

1933. Fraser, *Ceriagrion fallax, Fauna Brit. India, Odon.*, **1** : 321-323.

1991. Tsuda, *Ceriagrion fallax cerinomelas, A distributional list of World Odonata*, p. 26.

Material examined : Manipur: Signat, 1 Male, 30.x.1991; West Bengal : Bankura, 1 Female, 1.viii.1974.

Distribution : INDIA : Assam, Bengal, Sikkim (Fraser, 1933b); Arunachal Pradesh (Prasad, 1997 b); Himachal Pradesh (Kumar and Prasad, 1981; Kumar, 2005), Simla (Fraser, 1933 b); Manipur (Lahiri, 1977 b; Mitra, 2002 b); Meghalaya (Lahiri, 1987; Lieftinck *et al.*, 1984; Mitra, 1999); Mizoram (Prasad, 2007 b); West Bengal (Mitra, 2002 b).

Elsewhere : Bangladesh (Dasgupta, 1957); Bhutan (Mitra, 2008); China (Chao, 1981; Needham, 1930); Nepal (Kiauta, 1975); Tibet (Fraser, 1933 b); Taiwan (Lieftinck *et al.*, 1984), Vietnam (Cuong and Hoa, 2007).

Ceriagrion erubescens Selys (=***Ceriagrion aeruginosum***)
(Fig. 40)

1891. Selys, *Ceriagrion coromandelianum* race *erubescens, Ann. Mus. Civ. Genova*, (2) **10** (30) : 516.

1898. Krüger, *Ceriagrion erubescens, Stett. Ent. Ztg.*, **59** : 120.

1902. Laidlaw, *Ceriagrion erubescens, Proc. Zool. Soc. Lond.*, p. 388.

1933. Fraser, *Ceriagrion erubescens, Fauna Brit. India, Odon.*, **1** : 316-318.

Material examined : Assam: Barpeta, Doimari, 1 Male, 1 Female, 10.iv.1986; Great Nicobar: Leela Nullah (27 km on N.S. Road), 5 Male, 20-24.vii.1984.

Distribution : INDIA : Andaman and Nicobar Islands; Assam.

Elsewhere : Australia, Indonesia, Papua New Guinea, Solomon Islands (Tsuda, 2000).

Remarks : Asahina (1967) following Lieftinck (1933) it as Australio-Papuan species and synomised it with *Ceriagrion aeruginosum* (Brauer). But specimens at hand agree with descriptions of both by Fraser (1933 b) and Asahina (1967). Hence it is concluded that the distribution of the species is extended up to the North- East India, and *C. erubescens* reported by Fraser (1933 b) is *C. aeruginosum*.

Ceriagrion olivaceum Laidlaw
(Fig. 41)

1914. Laidlaw, *Ceriagrion olivaceum, Rec. Indian Mus.*, **8** : 345-346.

1933. Fraser, *Ceriagrion olivaceum, Fauna Brit. India, Odon.*, **1** : 324-326.

1983. Mitra, *Ceriagrion olivaceum olivaceum, Ent. Mon. Mag.*, **119** : 29.

2000. Tsuda, *Ceriagrion olivaceum, A distributional list of World Odonata,* p. 29.

Material examined : Arunachal Pradesh: Sessa, 1 Female, 21.iii.1973; Assam: Goalpara, 5 Male, 1 Female, 8.xii.1973; 6 Male, 2 Female, 12.xii.1973; Kaziranga, 2 Female, 25.xi.1974; Nowgang, 1 Female, 4.xi.1974; Tezpur, 1 Female, 3.iii.1973, 1 Male, 13.xii.1973; Manipur: Loktak lake, 1 Female, 25.v.1974; Orissa: Mayurbhanj, Baripada, 1 Male, 18.iii.1973; Tripura: Agartala, 1 Male, 31.x.1974; Teliamura, 1 Female, 11.xi.1974; 1 Female, 14.xi.1974; Udaipur, 1 Male, 7.xi.1974; West Bengal: Bankura, 1 Male, 31.vii.1974; 1 Male, 3.viii.1974; Calcutta, 1 Female, 11.x.1974; Darjeeling, 1 Female, 28.iii.1973; 1 Male, 2.iv.1976; 1 Male, 18.iv.1978; 1 Male, 1 Female, 28.xii.1975; 1 Male, 3 Female, 7.i.1976; 1 Male, 8.i.1976; Maharashtra: Bhandara, 1 Female, 22.x.1971; Nicobar: Car Nicobar, 1 Female, 12.v.1969 (Reported as *C. olivaceum auranticum* Fraser by Chhotani *et al.*, 1983).

Distribution : INDIA : Poona, Satara (Fraser, 1924 a); Shillong (Fraser, 1924 b); Coorg, Deccan, Wyanad (Fraser, 1931); Bengal (Lieftinck, 1948); Buxa (Bhasin, 1953); Nilgiris (Kimmins, 1966); Andaman and Nicobar Islands (Ram *et al.*, 2000); Andhra Pradesh (Prasad, 2007 a); Arunachal Pradesh (Mitra, 2002 b); Assam (Lahiri, 1979; Laidlaw, 1916 b; Lieftinck, 1948; Mitra, 2002 b); Karnataka: South Western Karnataka (Subramanian *et al.*, 2008); Kerala (Emiliyamma *et al.*, 2007); Madhya Pradesh (Mishra, 2007), Sagar (Srivastava and Suri Babu, 1997), Gwalior (Baijal and Agarwal, 1955); Maharashtra (Prasad, 1996 b; Kulkarni *et al.*, 2006 a; Babu and Nandy, 2010); Manipur (Mitra, 2002 b); Mizoram (Prasad, 1997 c and 2007 b); Orissa (Srivastava and Das, 1987); Tamil Nadu (Emiliyamma, 2009); Tripura (Srivastava and Sinha, 2000); West Bengal (Srivastava and Sinha, 1993).

Elsewhere : Burma (Myanmar) (Fraser, 1924 a; Laidlaw, 1916 b; Lieftinck, 1948), Bangladesh, Kampuchea, Laos, Malaysia, Nepal, Thailand, Vietnam (Tsuda, 1991).

Ceriagrion azureum (Selys)
(Fig. 42)

1891. Selys, Pseuda*grion azureum, Ann. Mus. Civ. Genova,* (2) **10** (30) : 513-515.

1933. Fraser, *Ceriagrion azureum, Fauna Brit. India, Odon.,* **1** : 328-330.

2000. Tsuda, *Ceriagrion azureum, A distributional list of World Odonata,* p. 28.

Material examined : Arunachal Pradesh: Namdhapa, 2 Male, 1 Female, 6.iv.1981; West Bengal : Bankura, 2 Male, 1 Female, 31.vii.1974.

Distribution : INDIA : Arunachal Pradesh (Lahiri, 1985; Mitra, 2002 b and 2006); Meghalaya (Fraser, 1933 b; Lahiri, 1987); Mizoram (Prasad, 2007 b); West Bengal (Mitra, 2002 b).

Elsewhere : Borneo, Ceylon (Sri Lanka), Indonesia, Indo-China, Java (Lieftinck, 1971); Singapore (Kiauta and Kiauta, 1982 a); Bangladesh, Burma (Myanmar), Indonesia, Kampuchea, Malaysia, Pakistan, Thailand, Vietnam (Tsuda, 1991 and 2000), Nepal (Ushijima, 2002).

Remarks : The venation of the species agrees with the venation of species of *Pseudagrion* Selys; indistinct frontal ridge in comparison to other species of *Ceriagrion* Selys indicates that the species may be a link population between *Pseudagrion* Selys and *Ceriagrion* Selys.

Ceriagrion coromandelianum (Fabricius)
(Figs. 43, 78)

1798. Fabricius, *Agrion coromandelianum, Ent. Syst.* Suppl., **1** : 287.

1876. Selys, *Ceriagrion coromandelianum, Bull. Acad. Belg.,* (2) **42** : 528.

1933. Fraser, *Ceriagrion coromandelianum, Fauna Brit. India, Odon.,* **1** : 315-316.

Material examined : Arunachal Pradesh : West Kameng, 1 Male, 8.ix.1986; Assam: Barpeta, 1 Male, 10.iv.1986; Goalpara, 1 Male, 4.vi.1973; Tezpur, 1 Male, 2 Female, 2.iii.1973; Bihar: Hazaribagh, 1 Male, 31.x.1974; Madhya Pradesh: Seoni, 1 Male, 2.xii.1971; Maharashtra: Bhandara, 1 Male, 23.x.1971; 1 Male, 24.x.1971; Manipur: Lamka, 1 Male, 21.x.1983; Moirang, 3 Male, 1 Female, 25.v.1974; Nagaland: Dimapur, 1 Female, 10.ix.1994; 4 Male, 6 Female, 17.ix.1994; 1 Female, 19.iii.1997; Kohima, 1 Male, 22.ix.1994; Orissa: Chilka, 1 Male, 19.iii.1979; Tripura: Agartala, 1 Male, 30.x.1974; West Bengal: Calcutta, 8 Male, 1 Female, 26.ii.1967; Jalpaiguri, 3 Male, 6 Female, 19-24.xii.1984. Pakistan : Punjab: Choa, Khewra Saltrange, 1 Male, 2 Female, 15-21.v.1930; Sind : Shah Hasan, 1 Male, —.x.1927.

Distribution : INDIA : Chilka lake (Fraser and Dover, 1922; Laidlaw, 1915); Calcutta (Kolkata), Purneah, Sibsagar (Laidlaw, 1916 b); Dibrugarh (Laidlaw, 1914); Bolluvampattis, Cochin, Coorg, Deccan, Kanara, Malabar, Nilgiris (Fraser, 1931); Buxa, Pusa, Mothronwala (Bhasin, 1953); Andhra Pradesh (Joseph and Satyarani, 1988; Prasad, 2007 a); Arunachal Pradesh (Mitra, 2006); Assam (Lahiri, 1979); Bihar (Prasad and Varshney, 1988); Chhattisgarh : Bastar (Prasad, 1996 a); Goa, Gujarat

(Prasad, 1995 and 2004); Himachal Pradesh (Kumar and Prasad, 1981; Kumar, 2005), Pong Dam (Babu *et al.*, 2009); Jharkhand (Bihar) (Mitra, 2002 b); Karnataka: Kudremukh National Park (Emiliyamma and Radhakrishnan, 2007), South Western Karnataka (Subramanian *et al.*, 2008); Kerala (Emiliyamma *et al.*, 2007); Madhya Pradesh (Mishra, 2007), Sagar (Srivastava and Suri Babu, 1997); Maharashtra, (Prasad, 1996 b; Kulkarni and Talmale, 2008 b; Babu and Nandy, 2010); Manipur (Srivastava and Sinha, 2004); Meghalaya (Lahiri, 1987; Mitra, 1999); Mizoram (Lahiri, 1979; Prasad, 2007 b); Nagaland (Mitra *et al.*, 2006); Orissa (Srivastava and Das, 1987); Pondicherry (Emiliyamma and Radhakrishnan, 2006 a); Punjab Shivalik (Sharma and Kumar, 2008); Tamil Nadu (Kumar, 1990; Emiliyamma, 2009); Tripura (Lahiri, 1977 a; Srivastava and Sinha, 2000); Uttarakhand (Prasad and Mondal, 2010), Garhwal Hills (Prasad, 1974), Dehra Dun (Mitra, 2000); Uttar Pradesh (Ram *et al.*, 1983); Agra (Baijal and Agarwal, 1955); West Bengal (Srivastava and Sinha, 1993).

Elsewhere : Myanmar (Burma) (Bhasin, 1953; Laidlaw, 1916 b); Nepal (Kiauta and Kiauta, 1982 b; St. Quentin, 1970); Bangladesh, China, Pakistan (Tsuda, 1991 and 2000); Sri Lanka (Ceylon) (Lieftinck, 1955 and 1971).

Intraspecific variation: Specimens from Bihar has a black spot on the abdominal segments 5-7; specimens from Maharashtra and Madhya Pradesh agree with the specimens from Manipur. Pakistan specimens agree with the description present in the *Fauna of British India.*

Ceriagrion cerinorubellum (Brauer)
(Fig. 44)

1815. Brauer, *Agrion (Pyrrhosoma) cerinorubellum, Novara Exped. Zool. 1. Neur.*, p. 59.

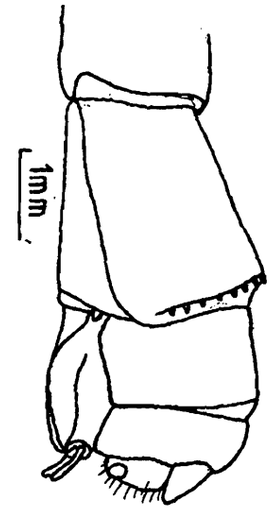
1876. Selys, *Ceriagrion cerinorubellum, Bull. Acad. Belg.*, (2) **42** : 526.

1933. Fraser, *Ceriagrion cerinorubellum, Fauna Brit. India, Odon.* **1** : 326-328.

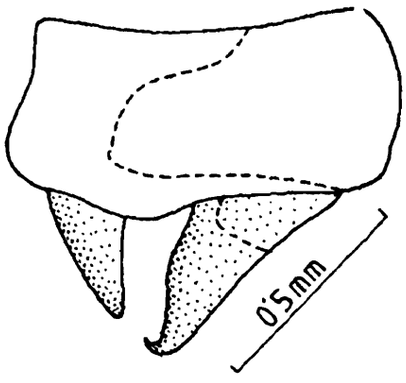
Material examined : Orissa: Cuttack, 1 Male, 3.xi.1973; West Bengal: Calcutta, 2 Male, 26.ii.1967; 1 Female, 5.v.1967; 2 Male, 12.x.1974.

Distribution : INDIA : Bihar, Kierpur, Purneah (Laidlaw, 1916 b); Coorg, Kanara, Malabar (Fraser, 1931); Andaman and Nicobar Islands: Little Andaman (Lahiri, 1998), North Andaman (Ram *et al.*, 2000); Bihar (Prasad and Varshney, 1988); Goa (Prasad, 1995); Himachal Pradesh (Kumar and Prasad, 1981; Kumar, 2005), Kangra (Prasad, 1976); Karnataka: South Western Karnataka (Subramanian *et al.*, 2008); Kerala (Emiliyamma *et al.*, 2007); Madhya Pradesh: Sagar (Srivastava and Suri Babu, 1997); Maharashtra (Prasad, 1996 b; Babu and Nandy, 2010); Orissa, (Mitra, 2002 b); Pondicherry (Emiliyamma and Radhakrishnan, 2006 a); Punjab Shivalik (Sharma and Kumar, 2008); Tamil Nadu (Emiliyamma, 2009); Tripura (Lahiri, 1979; Srivastava and Sinha, 2000); Uttarakhand: Dehra Dun (Mitra, 2000); West Bengal (Srivastava and Sinha, 1993; Mitra, 2002 b).

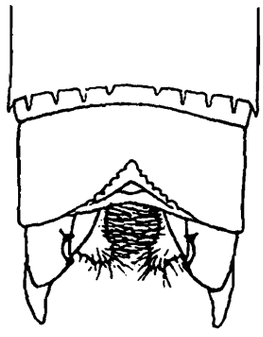
Elsewhere : Bornes, Ceylon (Sri Lanka), Indonesia, Indo-China, Java (Lieftinck, 1971); Singapore (Kiauta and Kiauta, 1982 a); Bangladesh, Burma (Myanmar), Indonesia, Kampuchea, Malaysia, Pakistan, Thailand, Vietnam (Tsuda, 1991 and 2000).



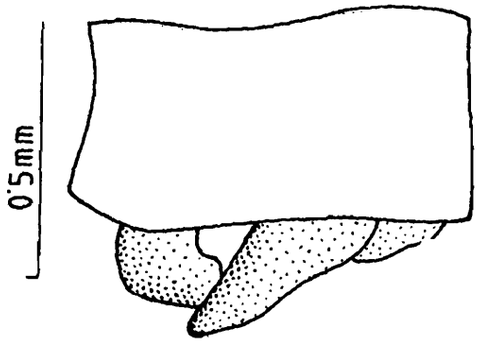
38



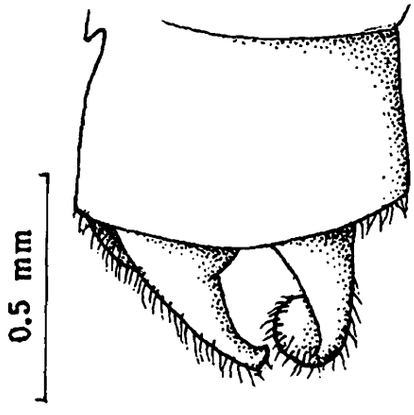
39



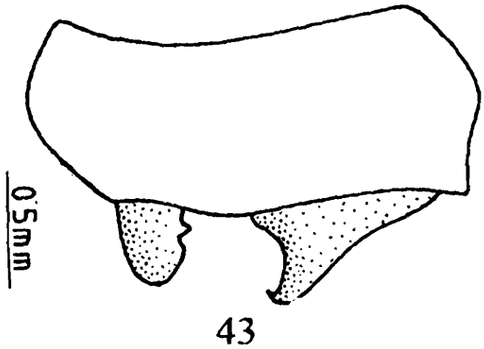
40



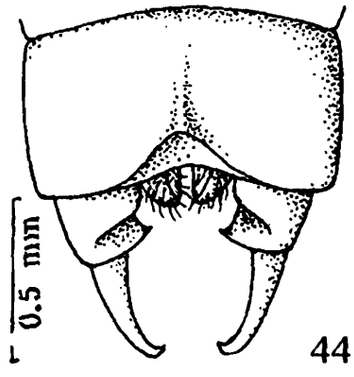
41



42



43



44

Figs. 38-44. 38. Left lateral view of 9th and 10th abdominal segments, anal appendages and genitalia of female *Ceriagrion praetermissum* Lieftinck; 39. Right lateral view of 10th abdominal segment and anal appendages of male *Ceriagrion fallax cerinomelas* Lieftinck; 40. Dorsal view of 10th abdominal segment and anal appendages of male *Ceriagrion erubescens* Selys; 41. Right lateral view of 10th abdominal segment and anal appendages of male *Ceriagrion olivaceum* Laidlaw; 42. Left lateral view of 10th abdominal segment and anal appendages of male *Ceriagrion azureum* (Selys); 43. Right lateral view of 10th abdominal segment and anal appendages of male *Ceriagrion coromandelianum* (Fabricius); 44. Dorsal view of 10th abdominal segment and anal appendages of male *Ceriagrion cerinorubellum* (Brauer)

Ceriagrion coeruleum Laidlaw

1919. Laidlaw, *Ceriagrion coeruleum, Rec. Indian Mus.*, **16** : 188-190.

Fraser (1933 b) synonymised with *Ceriagrion azureum* (Selys) but Tsuda (1991) reinstated it.

Distribution : INDIA : West Bengal: Darjeeling: Pashoke (Laidlaw, 1919).

Ceriagrion rubiae Laidlaw

1916. Laidlaw, *Ceriagrion rubiae, Rec. Indian Mus.*, **12** : 132-133.

1933. Fraser, *Ceriagrion rubiae, Fauna Brit. India, Odon.*, **1** : 318-319.

Material examined : Karnataka: Coorg: Gonikopal, 1 Male, 30.v.1923; Coorg: Somwarpet, 1 Male, 1 Female, 22.x.1925.

Distribution : INDIA : Coorg, Kanara, Malabar, Nilgiris (Fraser, 1924 and 1931); Karnataka: Kudremukh National Park (Emiliyamma and Radhakrishnan, 2007); Kerala (Emiliyamma *et al.*, 2007); Orissa (Srivastava and Das, 1987); Tamil Nadu (Emiliyamma, 2009).

Ceriagrion auranticum auranticum Fraser

1923. Fraser, *Ceriagrion aurantiacum, J. Bombay nat. Hist. Soc.*, **29** : 748.

1924. Fraser, *Ceriagrion aurantiacum, Rec. Indian Mus.*, **26** : 492.

Fraser (1933 b) synonymised with *Ceriagrion olivaceum* Laidlaw, but Rao and Lahiri (1982) mentioned *C. auranticum* Hämäläinen *et al.* (1999) and Tsuda (2000) reinstated as *Ceriagrion auranticum auranticum* Fraser.

Distribution : INDIA : Nilgiri, Wyanad, Coorg (Fraser, 1924 a); Andaman and Nicobar Islands: Great Nicobar (Hämäläinen *et al.*, 1999); Kerala: New Amarambalam Reserve Forests (Rao and Lahiri, 1982).

Elsewhere : Indonesia, Malaysia, Myanmar, Thailand, Vietnam (Tsuda, 2000).

Genus ***Ischnura*** Charpentier

1840. Charpentier, *Ischnura, Lib. Europ.*, p. 20.

1890. Kirby, *Micronympha, Syn. Cat. Neur. Odon.*, p. 140.

1933. Fraser, *Ischnura, Fauna Brit. India, Odon.*, **1** : 346.

Diagnostic characters: Head narrow, without any frontal ridge; postocular coloured spots present. Thorax short and robust; posterior lobe of prothorax usually with a pair of small horse-shoe shaped hooks. Wings hyaline, pterostigma of male shaped and coloured differently in fore-wings and hind-wings; moreover, very variable in the species; braced, covering one cell or less area; postnodals numbering from eight to nine or maximam ten in the fore-wings; six or seven in the hind-wings; discoidal cell acutely pointed at the distal end, with costal side about half the length of the

posterior side in the fore-wings; and about two-thirds the length of that side in the hind-wings; distal side very oblique; sectors of *arc* arising from the lower end of the *arc,* divergent from origin, *arc* situated at or little distal to the distal antenodal nervure; *ab* always present and complete, arising well proximal to the level of *ac*, which usually lies between the two antenodals; *ab* continued on as *IA* with an angulation at the junction of the two; R_{4+5} arising well before the oblique nerve descending from the node; IR_3 in continuation of that nervure.

Type-species : *Ischnura pumilo* Charpentier

Distribution : Afghanistan, Albania, Alaska, American Samoa, Argentina, Australia, Austria, Bahamas, Bangladesh, Belarus, Belgium, Belize, Bermuda, Brazil, Burgaria, Caymon Island, Chile, China, Colombia, Costa-Rica, Crotia, Cuba, Czech & Slovakia, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, Elsalvador, Estonia, Fiji, Finland, French Guiana, French Polynesia, Germany, Goudeloupe, Greece, Guatemala, Gum, Haiti, Hawaii, Holland, Hondurus, Hong Kong, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Kazakistan, Korea, Korea Democratic Republic, Laos, Latvia, Lesotho, Lichtenstein, Libya, Lithuania, Luxembourg, Macedenia, Madagascar, Mexico, Myanmar (Burma), Nepal, Netherlands, New Caledonia, New Hebrides, Nicaragua, Norway, Oman, Pakistan, Palau, Papua-New Guinea, Paraguaya, Peru, Peurto Rico, Poland, Qatar, Romania, Russian Federation, Sahara, Samoa, Saudi Arabia, Slovenia, Sri Lanka, Surinam, Syria, Switzerland, Taiwan, Tazikistan, Thailand, Tobago, Trinidad, Turkey, UAE, UK, USA, Ukraine, Venezuela, Vietnam.

KEY TO SPECIES OF THE GENUS *ISCHNURA* CHARPENTIER

1. Pterostigma with yellow distal border ..... *I. rufostigma mildredae* Fraser
– Pterostigma with reddish colour 2
– Pterostigma with bluish colour 3
2. Pterostigma of fore-wings ochreous with brown boundary ..... *I. inarmata* Calvert
– Pterostigma of fore-wings brick-red ..... *I. rufostigma rufostigma* Selys
– Pterostigma of fore-wings reddish-orange ..... *I. rufostigma anandalei* Laidlaw
– Pterostigma of fore-wings with rosy proximal half and white in the distal half... ..... *I. aurora aurora* (Brauer)
3. Segment 10 with blue spot on dorsum ..... *I. forcipata* Morton
– Segment 10 without a blue spot on dorsum 4
4. Segment 2 metallic blue ..... *I. senegalensis* (Rambur)
– Segment 2 non-metallic blue ..... *I. elegans elegans* (Vander Linden)

Ischnura senegalensis (Rambur)
(Figs. 45, 79, 80)

1842. Rambur, *Agrion senegalensis, Ins. Névrop.* p. 276.

1933. Fraser, *Ischnura senegalensis, Fauna Brit. India, Odon.*, **1** : 348-351.

Material examined : Bihar: Hazaribagh, 1 Male, 1 Female, 29.x.1974; Singhbhum, 1 Male, 8.xii.1974; Mizoram: Phaileng, 1 Female, 23.x.1991; Orissa: Balasore, 2 Male, 8.xii.1955; West Bengal: Calcutta, 1 Male, 1 Female, 16.x.1966; Maharashtra: Bhandara, 1 Female, 28.x.1971; Madhya Pradesh: Seoni, 1 Female, 2.xii.1971; Andaman Islands: Port Blair, 1 Male, 28.iii.1969; Nagaland: Zunheboto, Surohoto, 1 Female, 10.vii.1991. Pakistan : Punjab: Kallar Kahar Saltrange, 23 Male, 6 Female, 20-23.x.1930; Sadan Shah Saltrange, 2 Female, 25.iv.1931.

Distribution : INDIA : Chilka Lake (Laidlaw, 1915; Fraser and Dover, 1922); Puri (Laidlaw, 1916 b); Coorg, Deccan, Malabar, Nilgiris (Fraser, 1931); Andaman and Nicobar Islands: Andaman Islands (Chhotani *et al.*, 1983; Ram *et al.*, 2000), Nicobar Islands (Hämäläinen *et al.*, 1999; Mitra, 2002 a); Andhra Pradesh (Prasad, 2007 a); Bihar (Jharkhand) (Prasad and Varshney, 1988; Mitra, 2002 b); Chandigarh (Tyagi, 1984); Gujarat (Prasad, 2004); Himachal Pradesh (Kumar and Prasad, 1981; Kumar, 2005); Karnataka: South Western Karnataka (Subramanian *et al.*, 2008); Kerala (Emiliyamma *et al.*, 2005 and 2007); Madhya Pradesh (Mishra, 2007), Sagar (Srivastava and Suri Babu, 1997); Maharashtra (Prasad, 1996 b; Kulkarni and Talmale, 2008 b; Babu and Nandy, 2010), Pench National Park (Kalaskar and Kalaskar, 1998); Manipur (Lahiri, 1977 b); Mizoram (Mitra, 2002 b ; Prasad, 2007 b); Nagaland (Mitra, 2002 b); Orissa (Srivastava and Das, 1987); Pondicherry (Emiliyamma and Radhakrishnan, 2006 a); Punjab Shivalik (Sharma and Kumar, 2008); Rajasthan (Bose and Mitra, 1976); Tamil Nadu (Emiliyamma, 2009); Uttarakhand (Prasad and Mondal, 2010); West Bengal (Srivastava and Sinha, 1993), Calcutta (Dasgupta, 1957; Mitra, 1983).

Elsewhere : Burma (Myanmar), Bhamo, Mandalaya, Puepoli (Selys, 1891); Rangoon (Laidlaw, 1916 b); China (Chao, 1981; Needham, 1930; Rowe, 1981); Formosa (Needham, 1930); Micronesia (Lieftnick, 1962); Taiwan (Lieftinck *et al.*, 1984); Thailand (Kiauta and Kiauta, 1983 b); Ceylon (Sri Lanka), Moluccas, New Guinea (Lieftinck, 1971); Philippines (Kiauta and Kiauta, 1983 a); Senegal (Rambur, 1842); Throughout the African continent (Pinhey, 1962); Mauretiana (Dumont, 1976); Garamba National Park (Pinhey, 1966 b); Mocambique (Pinhey, 1981); Malawi (Pinhey, 1966 a and 1979); Annoban (Pinhey, 1974 a); Angola (Pinhey, 1975); Ngamiland (Pinhey, 1967); Tanzania (Pinhey and Pinhey, 1984); Somaliland (Carfi, 1974); Madagascar (Carfi and Terzani, 1991); Afghanistan, Bangladesh, Hong Kong, Iran, Kampuchea, Vietnam (Tsuda, 1991 and 2000); Pakistan (Khaliq and Yousuf, 1993 b; Mitra and Babu, 2009).

Ischnura bhimtalensis Sahni

1965. Sahni, *Ischnura bhimtalensis, Indian J. Ent.*, **27** : 207-209.

Hämäläinen (1989), Mitra (1992) and Prasad and Varshney (1995) synonymised to *I. aurora aurora* (Brauer).

Ischnura aurora aurora (Brauer)
(Fig. 47)

1858. Hagen, *Agrion delicatum, Verh. zool.-bot. Ges. Wein.*, **8** : 479.

1865. Brauer, *Agrion aurora, Verh. zool.-bot. Ges. Wein.*, **15** : 510.

1933. Fraser, *Ischnura delicata, Fauna Brit. India, Odon.*, **1** : 360-362.

2000. Tsuda, *Ischnura aurora aurora, A distributional list of World Odonata*, p. 36.

2002. Mitra, *Ischnura aurora aurora, Mem. zool. Surv. India*, **19** (1) : 74-75.

Material examined : Assam: Goalpara, 1 Male, 20.iv.1973; 4 Male, 1 Female, 23.xii.1973; Bihar: Hazaribagh, 1 Male, 1 Female, 29.x.1974; 1 Female, 30.x.1974; Palamau, 1 Female, 3.vii.1975; Singhbhum, 1 Male, 4 Female, 8.xii.1974; 1 Male, 12.xi.1983; 8 Male, 1 Female, 29.x.1991; Nagaland: Dimapur, 1 Male, 18.xi.1994; Orissa: Bolangir, 1 Male, 8.xi.1973; 2 Male, 9.xi.1973; Sambalpur, 1 Male, 31.x.1972; Sikkim: Ranipool, 2 Male, 12.x.1988; West Bengal: Bankura, 3 Male, 1 Female, 31.vii.1974; Birbhum, 1 Female, 8.x.1974; Burdwan, 1 Male, 1 Female, 26.x.1968; Calcutta, 1 Male, 16.x.1966; 1 Male, 23.x.1966; 1 Male, 29.i.1967; Darjiling, 1 Male, 30.v.1974; Jalpaiguri, 4 Male, 20.xii.1984. Pakistan: Bubak, Sind, 2 Male, 25.xi.1927; Choa, 10 miles from Khewra Saltrange, 1 Male, 15-21.x.1930; Gandhala Reserve Forest, Choa, Saidan Shah Saltrange, 4 Male, 2 Female, 25.iv.1931; Choa, Saidan Shah Saltrange, 1 Female, 16.iv.1931.

Distribution : INDIA : Bengal (Selys, 1891); Nagpur (Laidlaw, 1919); Barkuda Island (Fraser and Dover, 1922); Coonoor, Ooty Lake (Fraser, 1924 b); Bolovumpattis, Cochin, Coorg, Deccan, Kanara, Malabar, Nilgiris (Fraser, 1931); Dehra Dun, Mothronwala, Nalapani, Gorakhpur, Surpur (Bhasin, 1953); Andhra Pradesh (Prasad, 2007 a); Arunachal Pradesh, Assam (Lahiri, 1979); Bihar (Prasad and Varshney, 1988); Gujarat (Prasad, 2004); Goa (Prasad, 1995; Kulkarni and Talmale 2008 a); Himachal Pradesh (Kumar and Prasad, 1981; Kumar, 2005), Simbalbara Wildlife Sanctuary (Babu and Mehta, 2009); Jharkhand (Bihar) (Mitra, 2002 b); Karnataka: Biligiri Rangaswamy Temple Wildlife Sanctuary, Kudremukh National Park (Emiliyamma and Radhakrishnan, 2006 b and 2007), South Western Karnataka (Subramanian *et al.*, 2008); Kerala (Emiliyamma *et al.*, 2007), Silent Valley (Rao and Lahiri, 1982); Madhya Pradesh (Mishra, 2007), Sagar (Srivastava and Suri Babu, 1997); Maharashtra (Prasad, 1996 b; Kulkarni and Prasad, 2005; Kulkarni and Talmale, 2008 b; Kulkarni *et al.*, 2006 a b; Babu and Nandy, 2010), Pench National Park (Kalskar and Kalaskar, 1998); Manipur (Lahiri, 1977 b; Srivastava and Sinha, 2004); Meghalaya (Lahiri, 1987; Mitra, 1999); Mizoram (Mitra, 2002 b; Prasad, 2007 b); Nagaland (Mitra *et al.*, 2006); Orissa (Srivastava and Das, 1987); Pondicherry (Emiliyamma and Radhakrishnan, 2006 a); Punjab Shivalik (Sharma and Kumar, 2008); Rajasthan (Prasad and Thakur, 1981); Tripura (Srivastava and Sinha, 2000); Uttarakhand (Prasad and Mondal, 2010), Garhwal Hills (Prasad, 1974), Dehra Dun (Mitra, 2000); Tamil Nadu (Kumar, 1990; Emiliyamma, 2009); West Bengal (Srivastava and Sinha, 1993).

Elsewhere : Australia (Laidlaw, 1916 b); Burma, Iado (Selys, 1891); Ceylon (Laidlaw, 1916 b and 1951; Lieftinck, 1971; Selys, 1891); China (Needham, 1930); Micronesia (Lieftinck, 1962); Nepal (Kiauta, 1975; St. Quentin, 1970); New Zealand (Penniket, 1966); Tahiti (Selys, 1891); Afghanistan, Bangladesh, Indonesia, Iran, Japan, Pakistan, Philippines, Thailand, Taiwan (Tsuda, 1991); Bhutan (Mitra, 2008).

Remarks : Papazian *et al.* (2007) considered Indian population to be recognized as *I. aurora rubilio*. Since, Selys (1876) coined *rubilio* for a population of *I. delicata* from India, without citing any reason for naming *I. rubilio*. If "*rubilio*" means "red" then we believe, Selys probably indicated the colour of anterior portion of pterostigma of forewings. Since, we have not examined specimens from other countries we like to recognize Indian population as *I. aurora aurora* (Brauer).

Ischnura elegans elegans (Vander Linden)
(Fig. 48)

1823. Vander Linden, *Agrion elegans, Opusc. Sci.*, **4** : 104.

1876. Selys, *Ischnura elegans, Bull. Acad. Belg.* (2) **41** : 277.

1933. Fraser, *Ischnura elegans, Fauna Brit. India, Odon.*, **1** : 351-354.

1991. Tsuda, *Ischnura elegans elegans, A distributional list of World Odonata*, p. 34.

Material examined : Orissa: Cuttack, 1 Male, 6.xii.1965; West Bengal: Calcutta, 1 Male, 11.xii.1966; 2 Male, 1.i.1967; Bihar: Santhal Parganas, 1 Female, 4.iii.1930; Pakistan: N.W.F. Province (Undivided India), Bakhi, Murtaz valley, 1 Male, —.viii.1930; Kallar Kahar Salt Range, 1 Male, 20-23.x.1930.

Distribution : INDIA : Andhra Pradesh (Joseph and Satyarani, 1988); Gujarat (Prasad, 2004); Jharkhand (Bihar); Manipur (Srivastava and Sinha, 2004); Orissa (Mitra, 2002 b); West Bengal: Calcutta (Mitra, 1983).

Elsewhere : China (Needham, 1930); North West Frontier Province (Now in Pakistan) (Fraser, 1919 b); Iraq (Bhasin, 1953); Germany (Benken, 1980; Korman, 1966); Kantos Graubunden (Schiess and Demarmels, 1979); Greece (Hämäläinen, 1983); Albania, Algeria, Austria, Belgium, Burgaria, Belarus, China, Croatia, Czech and Slovakia, Denmark, Estonia, Finland, France, Great Britain, Ireland, Italy, Japan, Lichtenstein, Lithuania, Latvia, Luxembourg, Macedonia, Netherlands, Norway, Nepal, Poland, Rome, Russian Federation, Slovenia, Swaziland, Switzerland, Ukraine (Tsuda, 2000); Pakistan (Mitra and Babu, 2009).

Ischnura rufostigma complex

Although Asahina (1991) reviewed *Ischnura rufostigma* group of South east Asia, here the species are classified following Vick (1986).

Ischnura rufostigma anandalei Laidlaw
(Fig. 46)

1919. Laidlaw, *Ischnura anandalei, Rec. Indian Mus.*, **16** : 175-177.

1933. Fraser, *Ischnura anandalei, Fauna Brit. India, Odon.*, **1** : 364-366.

1991. Tsuda, *Ischnura rufostigma anandalei, A distributional list of World Odonata*, p. 36.

Material examined : Manipur: Moirang, 2 Male, 14 Female, 15-20.iii.1974; Orissa: Bolangir, 3 Male, 5.x.1972; 1 Female, 10.x.1972; Sundergarh, 1 Male, 21.ix.1972.

Distribution : INDIA : Manipur (Lahiri, 1977 b; Mitra, 2002 b); Orissa (Mitra, 2002 b); Rajasthan (Bose and Mitra, 1976).

Elsewhere : Burma (Fraser, 1933 b); Inle Lake (Laidlaw, 1919); Nepal (Kiauta, 1975); Bangladesh, China, Laos, Thailand, Vietnam (Tsuda, 1991).

Ischnura rufostigma mildredae Fraser
(Fig. 49)

1927. Fraser, *Ischnura mildredae, Rec. Indian Mus.*, **29** : 87-88.

1933. Fraser, *Ischnura mildredae, Fauna Brit. India, Odon.*, **1** : 366-368.

1991. Tsuda, *Ischnura rufostigma mildredae, A distributional list of World Odonata*, p. 36.

Material examined : Manipur: Signat, 1 Male, 26.iii.1974; Ukhrul, 1 Male, 4.iii.1975; West Bengal: Calcutta, 1 Male, 31.x.1975.

Distribution : INDIA : Arunachal Pradesh (Prasad, 1997 b); Manipur (Mitra, 1975 a; Mitra, 2002 b); Orissa (Mitra, 2002 b); Mizoram (Prasad, 2007 b); West Bengal.

Elsewhere : Burma (Myanmar) (Fraser, 1927); Nepal (St. Quentin, 1970); Hong Kong (Tsuda, 1991 and 2000).

Ischnura rufostigma rufostigma Selys
(Fig. 50)

1876. Selys, *Ischnura rufostigma, Bull. Acad. Belg.* (2) **41** : 283.

1933. Fraser, *Ischnura rufostigma, Fauna Brit. India, Odon.*, **1** : 362-364.

1991. Tsuda, *Ischnura rufostigma rufostigma, A distributional list of World Odonata*, p. 34.

Material examined : Manipur: Signat, 1 Male, 26.iii.1974; Ukhrul, 1 Male, 4.iii.1975; West Bengal: Calcutta, 1 Male, 31.x.1975.

Distribution : INDIA : Dibrugarh, N.E. Assam (Laidlaw, 1916 b); Madhya Pradesh: Sagar (Srivastava and Suri Babu, 1997); Manipur (Lahiri, 1977 b; Mitra, 2002 b); Meghalaya (Lahiri, 1987); Nagaland (Mitra *et al.*, 2006); West Bengal (Srivastava and Sinha, 1993; Mitra, 2002 b).

Elsewhere : Nepal (Ushijima, 2002).

Ischnura forcipata Morton
(Figs. 51, 81)

1907. Morton, *Ischnura forcipata, Trans. Ent. Soc. Lond.*, p. 306.

1933. Fraser, *Ischnura forcipata, Fauna Brit. India, Odon.*, **1** : 354-357.

Material examined : Orissa: Bolangir, 1 Male, 9.xi.1972 (India); Pakistan: Choa, Khewra Saltrange, 1 Male, 15-21.x.1930; Sodi Saltrange, 1 Male, 16.x.1930; Choa, Sadan Shah Saltrange, 1 Male, 25.iv.1932.

Distribution : INDIA : Kumaon (Laidlaw, 1916 b); Bengal, Punjab, Simla, Mussorie (Fraser, 1933 b); Almora, Samkhet, Sobla, Mussorie, Keyerkuli, Naini Tal, Sat Tal (Bhasin, 1953); Himachal Pradesh (Kumar and Prasad, 1981; Kumar, 2005); Orissa (Srivastava and Das, 1987); Uttarakhand (Kumar, 1982; Prasad and Mondal, 2010), Garwal Hills (Prasad, 1974), Dehra Dun (Mitra, 2000); West Bengal : Calcutta (Ram *et al.*, 1982).

Elsewhere : Quetta, Baluchistan (Fraser, 1933 b); Nepal (Kiauta, 1975); Bhutan (Mitra, 2008); Afghanistan, Bangladesh, Iran, Nepal (Tsuda, 2000); Pakistan (Mitra and Babu, 2009).

Ischnura inarmata Calvert

1898. Calvert, *Ischnura inarmata, Proc. Acad. Nat. Sci. Phil.*, pp. 147-148.

1933. Fraser, *Ischnura inarmata, Fauna Brit. India, Odon.*, **1** : 357-360.

2000. Tsuda, *Ischnura inarmata, A distributional list of World Odonata*, p. 36.

Material examined : Pakistan: Bubak, Sind, 1 Female, 25.xi.1927; Kallar Kahar Saltrange, Punjab, 1 Female, 20-23.x.1930; Saidan Shah Saltrange, Punjab, 2 Female, 25.iv.1931; Saidan Shah Saltrange, Punjab, 2 Female, 1.v.1932.

Distribution : INDIA : Kashmir (Fraser, 1933 b; Asahina, 1978).

Elsewhere : Pakistan (Mitra and Babu, 2009).

Ischnura pumilio (Charpentier)

1825. Charpentier, *Agrion pumilio, Hor. Ent.*, p. 22.

1876. Selys, *Ischnura pumilio, Bull. Acad. Belg.* (2) **41** : 267.

No specimen could be examined.

Distribution : INDIA : Kashmir : Ladak (Asahina, 1978).

Elsewhere : Afghanistan, China, Iran, Europe, Russia (Tsuda, 2000).

Genus ***Rhodischnura*** Laidlaw

1919. Laidlaw, *Rhodischnura, Rec. Indian Mus.*, **16** : 171, 177.

1933. Fraser, *Rhodischnura, Fauna Brit. India, Odon.*, **1** : 368-369.

1991. Tsuda, *Rhodischnura, A distributional list of World Odonata*, p. 47.

Diagnostic characters : Head narrow, without any frontal ridge; postocular spots absent in matured individuals; posterior lobe of prothorax simple; thorax short and thick, abdomen cylindrical nearly of even with anal appendages short, inconspicuous; inferiors are subforcipate or slightly forcipate; segment 8 of female with a ventral apical spine. Wings hyaline, pterostigma shaped and coloured differently in fore- and hind-wings, that of forewing coloured, six postnodals in the fore-wings of male and seven in females; five postnodals in the hind-wings in male, six in females; discoidal cell is like that of *Ischnura* species; other features of venation is similar to *Ischnura*

species. Penile structure of male almost same in two genera. The variation between two genera on the width of the gap between apical tubercles on the dorsum of the segment ten of males of two genera.

Type species : *Rhodischnura nursei* (Morton)

Distribution : India, Bangladesh, Pakistan.

Remarks on relationship between *Ischnura* Charpentier and *Rhodischnura* Laidlaw

Rhodischnura Laidlaw is a monotypic genus. The only species so far recorded occurs in India, Bangladesh and Pakistan. *Rhodischnura nursei* (Morton) was first described as *Ischnura nursei* by Morton. It is to be considered that most of the characters including the penile structure of *Rhodischnura nursei* are identical to different species of *Ischnura* Charpentier. The only morphological character which is considered different from *Ischnura* is the width of the gap between tubercles on the tenth abdominal segment of males. Since the evolutionary function of the gap of apical tubercles has not yet been firmly established, it is proposed that the two genera may be merged to one genus *Ischnura* Charpentier or *Rhodischnura* may be treated as the subgenus of *Ischnura*.

Rhodischnura nursei (Morton)
(Figs. 52, 82)

1907. Morton, *Ischnura nursei, Trans. Ent. Soc. Lond.* pp. 306-307.

1919. Laidlaw, *Rhodischnura nursei, Rec. Indian Mus.*, **16** : 171, 177.

1933. Fraser, *Rhodischnura nursei, Fauna Brit. India, Odon.*, **1** : 369-371.

Material examined : Orissa: Bolangir, 1 Male, 9.xi.1972; Kashmir: Srinagar, 1 Female, 7.ix.1932. Pakistan : Sind, Bubak, 2 Male, 25 & 28.xi.1927; Sind, Shah Hasan, 3 Female, —.xi.1927; Kallar Kahar Saltrange, 2 Female, 20-23.x.1930; Nam Shara Saltrange, 1 Male, 24.iv.1931; Kallar Kahar Saltrange, 1 Female, 8.iv.1932.

Distribution : INDIA : Barkuda Island (Fraser and Dover, 1922); Nagpur (Fraser, 1930); Coorg, Malabar (Fraser, 1931); Dehra Dun, Mothronwala (Bhasin, 1953); Andhra Pradesh (Prasad, 2007 a); Gujarat (Prasad, 2004); Madhya Pradesh: Sagar (Srivastava and Suri Babu, 1997); Maharashtra (Babu and Nandy, 2010), Pench National Park, Tadoba Andhari Tiger Reserve (Kulkarni *et al.*, 2004, 2006 a); Manipur (Srivastava and Sinha, 2004); Orissa (Mitra, 2002 b); Punjab Shivalik (Sharma and Kumar, 2008); Rajasthan (Tyagi and Miller, 1991); Uttarakhand (Kumar and Prasad, 1981; Prasad and Mondal, 2010), Dehra Dun (Mitra, 2000).

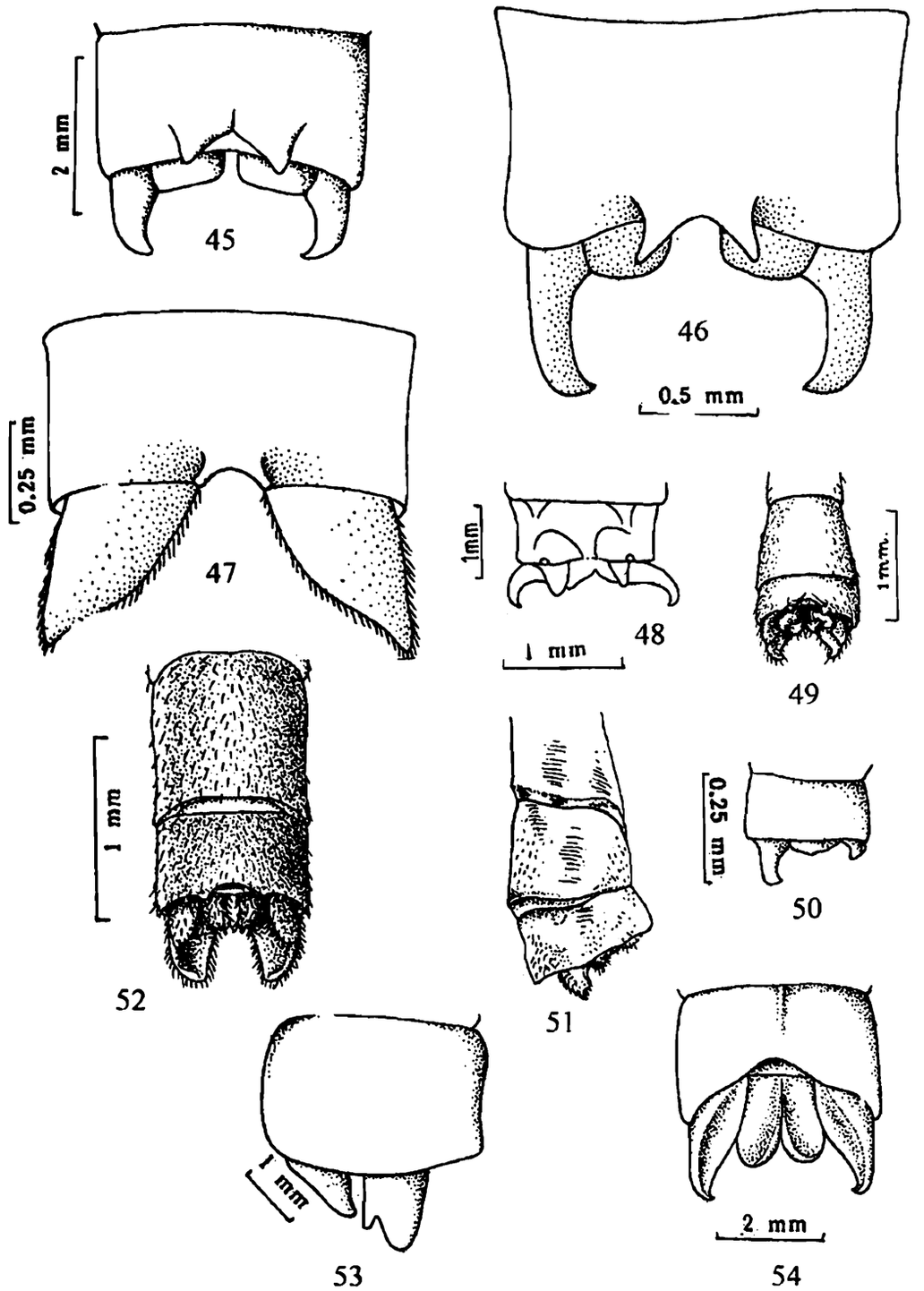
Elsewhere : Bangladesh (Tsuda, 1991 and 2000); Pakistan (Fraser, 1933 b; Khaliq and Yousuf, 1993 b; Mitra and Babu, 2009).

Genus ***Aciagrion*** Selys

1891. Selys, *Aciagrion, Ann. Mus. Civ. Genova* (2) **10** (30) : 509-511.

1933. Fraser, *Aciagrion, Fauna Brit. India, Odon.*, **1** : 333-334.

1991. Tsuda, *Aciagrion, A distributional list of World Odonata*, p. 17.



Figs. 45-54. 45. Dorsal view of 10th abdominal segment and anal appendages of male *Ischnura senegalensis* (Rambur); 46. Dorsal view of 10th abdominal segment and anal appendages of male *Ischnura rufostigma anandalei* Laidlaw; 47. Dorsal view of 10th abdominal segment and anal appendages of male *Ischnura aurora aurora* (Brauer); 48. Dorsal view of 10th abdominal segment and anal appendages of male *Ischnura elegans elegans* (Vander Linden); 49. Dorsal view of 9th and 10th abdominal segments and anal appendages of male *Ischnura rufostigma mildredae* Fraser; 50. Right lateral view of 10th abdominal segment and anal appendages of male *Ischnura rufostigma rufostigma* Selys; 51. Right lateral view of 9th and 10th abdominal segments and anal appendages of male *Ischnura forcipata* Morton; 52. Dorsal view of 9th and 10th abdominal segments and anal appendages of male *Rhodischnura nursei* (Morton); 53. Left lateral view of 10th abdominal segment and anal appendages of male *Aciagrion hisopa hisopa* (Selys); 54. Dorsal view of 10th abdominal segment and anal appendages of male *Aciagrion occidentale* Laidlaw

Diagnostic characters: Head narrow, having triangular postocular area or coloured spots; thorax rather slim; posterior lobe of prothorax simple in both sexes. Abdomen exceedingly slim, variable or great length, cylindrical; legs short, tibial spines moderately long, about 5 in number in the hind pair, anal appendages variable, very short and almost insignificant, occasionally notched at apex or squared; inferiors very minute. Wings very narrow and subacute at apex, hyaline, pterostigma differing in fore and hind-wings, that of fore-wing nearly double the size of the hind-wings; narrow diamond shaped, distal and proximal side very oblique in fore-wing, but that in the hind-wing with distal side much less oblique than the proximal, poorly braced, covering less than one cell, post nodals vary from 10 to 13 in number in fore-wings, discoidal cell acutely pointed at distal end, with costal side less than half the length of the posterior in fore-wings, nearly more than half the length in the hind-wings, basal side equal to the costal in the hind, distal side almost in line with the costal; *arc* situated at the level of the distal antenodal nervure, *ab* originate where the *ac* meets the hinder border of the wing; and continued on as *IA*; but their junction strongly angulated; R_{4+5} arising well before or just before the level of the nervure descending from the subnode, IR_3 is in continuation of that nervure.

Type species : *Aciagrion hisopa* Selys

Distribution : Angola, Australia, Bangladesh, Botswana, Burma, China, Congo, Coted' ivorie, Gabon, India, Indonesia, Japan, Kampuchea, Korea, Liberia, Malaysia, Malawi, Mozambique, Nepal, Papua New Guinea, Pakistan, Singapore, Sri Lanka, Taiwan, Thailand, Tanzania, Uganda, Zambia, Zimbabwe, Zaire.

KEY TO SPECIES OF GENUS *ACIAGRION* SELYS

MALE

1. Abdomen less than 30 mm 2
– Abdomen not less than 30 mm 3
2. Thorax azure blue, steely black on dorsum, narrow greenish-yellow antehumeral stripe ..... *A. occidentale* Laidlaw
– Thorax broadly black on dorsum, laterally lilaceous-violet, fading to pinkish beneath ..... *A. hisopa hisopa* (Selys)
– Thorax black on dorsum, blue antehumeral stripes, laterally blue ..... *A. approximans* (Selys)
3. Abdomen 32-34 mm ..... *A. olympicum* Laidlaw
– Abdomen 31 mm ..... *A. pallidum* Selys
– Abdomen 30 mm ..... *A. azureum* Fraser

FEMALE

1. Abdomen 22-26 mm 2

– Abdomen 30 mm or more 3

2. Hind-wing 16 mm ..... *A. occidentale* Laidlaw

– Hind-wing 15 mm ..... *A. approximans* (Selys)

– Hind-wing 17 mm ..... *A. hisopa hisopa* (Selys)

3. Hind-wing 22 mm ..... *A. olympicum* Laidlaw

– Hind-wing 20 mm 4

4. Segment 2 of the abdomen whitish with blue mark on sides ... *A. pallidum* Selys

– Segment 2 of the abdomen with a broad black thistle-shaped mark, sides blue.. ..... *A. azureum* Fraser

Aciagrion hisopa hisopa (Selys)
(Figs. 53, 83)

1876. Selys *Pseudagrion hisopa, Bull. Acad. Belg.*, (2) **42** : 509.

1891. Selys, *Aciagrion hisopa, Ann. Mus. Civ. Genova*, (2) **10** (30): 511-512.

1933. Fraser, *Aciagrion hisopa, Fauna Brit. India, Odon.*, **1** : 340-342.

1991. Tsuda, *Aciagrion hisopa hisopa, A distributional list of World Odonata*, p. 18.

Material examined : Sikkim: Chulung, 3 Male, 20.x.1977; Rangdom, 1 Male, 19.x.1977; West Bengal: Bankura, 1 Female, 31.vii.1974.

Distribution : INDIA : Darjiling (Selys, 1891); Coorg, Deccan, Nilgiris, Travancore (Fraser, 1931); Mahabaleswar, Satara, Poona (Fraser, 1933 b); Andhra Pradesh (Prasad, 2007 a); Chhattisgarh : Indravati Tiger Reserve (Mitra, 1995 c); Goa (Kulkarni and Talmale (2008 a); Kerala (Emiliyamma *et al.*, 2007), New Amarambalam Reserve Forests (Rao and Lahiri, 1982); Maharashtra (Prasad, 1996 b; Babu and Nandy, 2010); Sikkim: Chulung and Rangdom (Mitra, 2002 b); Tamil Nadu (Emiliyamma, 2009); West Bengal: Bankura (Mitra, 2002 b).

Elsewhere : Myanmar (Laidlaw, 1924; Lieftinck, 1948; Selys, 1891); China (Klots, 1947; Needham, 1930); Malacca (Selys, 1891); Malaysia (Fraser, 1933 b; Lieftinck, 1954); Siamese Malaya, Singapore (Laidlaw, 1924); Japan (Lieftinck, 1948); Bangladesh, Sri Lanka, Malaysia, Nepal, Thailand, Vietnam (Tsuda, 1991 and 2000); Pakistan (Khaliq and Maula, 1999).

Aciagrion occidentale Laidlaw
(Fig. 54)

1919. Laidlaw, *Aciagrion hisopa* Selys race *occidentalis, Rec. Indian Mus.*, **16** : 186.

1923. Fraser, *Aciagrion occidentalis, J. Bombay nat. Hist. Soc.*, **29** : 749.

1933. Fraser, *Aciagrion occidentale, Fauna Brit. India, Odon.*, **1** : 335-337.

Material examined : Orissa : Mayurbhanj, 1 Female, 28.i.1986; Sundergarh, 1 Male, 22.ix.1972.

Distribution : INDIA : Bombay, Cochin, Kanara, Parambikulum, Trichur (Laidlaw, 1919); Bolovumpattis, Coorg, Malabar, Nilgiris (Fraser, 1931); Andhra Pradesh (Prasad, 2007 a); Chhattisgarh : Bastar (Prasad, 1996 a); Goa (Prasad, 1995); Karnataka: Biligiri Rangaswamy Temple Wildlife Sanctuary, Kudremukh National Park (Emiliyamma and Radhakrishnan, 2006 b and 2007); Kerala (Emiliyamma *et al.*, 2007); Lakshadweep and Minicoy Islands (Prasad, 2001); Maharashtra (Prasad, 1996 b; Kulkarni and Talmale, 2008b; Babu and Nandy, 2010); Orissa (Mitra, 2002 b); Tamil Nadu (Emiliyamma, 2009); West Bengal (Srivastava and Sinha, 1993).

Elsewhere : Ceylon (Fraser, 1933 b; Laidlaw, 1924 and 1951; Lieftinck, 1971); Kampuchea, Sri Lanka, Thailand, Vietnam (Tsuda, 1991 and 2000).

Aciagrion olympicum Laidlaw
(Fig. 55)

1919. Laidlaw, *Aciagrion olympicum, Rec. Indian Mus.*, **16** : 171.

1933. Fraser, *Aciagrion olympicum, Fauna Brit. India, Odon.*, **1** : 337-339.

Material examined : Arunachal Pradesh: Subansiri, 1 Male, 1 Male, 13.v.1966; 1 Male, 15.v.1966; Sikkim: Rabangla, 1 Male, 6.x.1988; Tumin, 1 Female, 25.ix.1988; 6 Female, 29.ix.1988; West Bengal: Darjiling: 1 Male, 29.iii.1973; Jalpaiguri, 8 Male, 3 Female, 19-23.xii.1984.

Distribution : INDIA : Arunachal Pradesh (Mitra, 2002 b; Prasad, 1997 b); Sikkim (Fraser, 1933 b; Mitra, 2002 b); West Bengal : Darjiling (Fraser, 1933 b; Laidlaw, 1919; Mitra, 2002 b), Jalpaiguri (Mitra, 2002 b).

Elsewhere : Nepal (Tsuda, 1991 and 2000).

Aciagrion approximans (Selys)
(Fig. 56)

1876. Selys, *Pseudagrion microcephalum* race *approximans, Bull. Acad. Belg.*, (2) **42** : 507-508.

1891. Selys, *Aciagrion approximans, Ann. Mus. Civ. Genova*, (2) **10** (30): 512.

1933. Fraser, *Aciagrion approximans, Fauna Brit. India, Odon.*, **1** : 342-344.

Material examined : Arunachal Pradesh: Takila, 2 Male, 20.xi.1975; Manipur: Signat, 2 Male, 26.iii.1974; Sikkim: Chulung, 1 Male, 20.x.1977.

Distribution : INDIA : Shillong, Tura (Laidlaw, 1924); Cherrapunje (Laidlaw, 1919); Khasia Hills (Fraser, 1933 b); Arunachal Pradesh (Lahiri, 1979; Mitra, 2002 b); Manipur (Lahiri, 1977 b; Mitra, 2002 b); Nagaland (Bhasin, 1953); Sikkim (Mitra, 2002 b); West Bengal : Duars of Bengal (Sinha and Chakraborty, 1996).

Remarks : Lahiri (1987) reported it as synonym of *Aciagrion tillyardi* Laidlaw without citing any reason. Suceeding workers have not accepted his views.

Aciagrion azureum Fraser

1922. Fraser, *Aciagrion azureum, Mem. Dept. Agri. India (Ent.)*, 7 (7): 51.

1933. Fraser, *Aciagrion azureum, Fauna Brit. India, Odon.*, **1** : 339-340.

Material examined : Assam: Barpeta, 1 Female, 16.iv.1986; Doimari, 2 Male, 10.iv.1986.

Distribution : INDIA : Assam : Margharita (Fraser, 1933 b; Kimmins, 1966), Barpeta, Doimari (Mitra, 2002 b);

Elsewhere : Burma (Myanmar) (Tsuda, 1991 and 2000).

Aciagrion borneense Ris

1911. Ris, *Aciagrion borneense, Ann. Soc. Ent. Belg.*, **55** : 234-235.

1924. Laidlaw, *Aciagrion borneense, Proc. U.S. Nat. Mus.*, **66** : 4, 7.

1954. Liefinck, *Aciagrion borneense, Treubia,* **22** : 76.

Distribution : INDIA : Mizoram (Prasad, 1997 b; 2007 b).

Elsewhere : Indonesia, Malaysia, Philippines, Thailand (Tsuda, 2000).

Remarks : Prasad (1997 c) reported it from Mizoram. During the preparation of manuscript of *Geographical distribution of Odonata (Insecta) of Eastern India*, Mitra (2002 b) reported it in the section recorded from literature.

Aciagrion pallidum Selys
(Fig. 57)

1891. Selys, *Aciagrion pallidum, Ann. Mus. Civ. Genova,* (2) **10** (30): 512-513.

1933. Fraser, *Aciagrion pallidum, Fauna Brit. India, Odon.*, **1** : 344-345.

Material examined : Assam: Barpeta, 1 Male, 10.iv.1986; Goalpara, 1 Male, 8.xii.1973; Bihar: Palamau, 2 Male, 5 Female, 17.xi.1974; Singhbhum, 7 Male, 5 Female, 7.xii.1974; Orissa: Bolangir, 1 Female, 7.xi.1972; Tripura: Ambana, 1 Male, 16.xi.1974; West Bengal: Darjiling, 5 Male, 5 Female, 5.i.1973; Jalpaiguri, 3 Male, 4 Female, 19-24.xii.1974; Madhya Pradesh : Indravati Tiger Reserve, 8 Male, 4 Female, 9.ii.1990.

Distribution : INDIA : Dibrugarh, NE Assam (Laidlaw, 1914); Darjiling district, Nurbong, bottom of Mahanadi valley (Laidlaw, 1919); Mormugoa, Portugeese India (Laidlaw, 1919); Nagpur, North Kanara (Laidlaw, 1924); Khandala, Mahabaleswar (Fraser, 1924 a); Deccan (Fraser, 1931); Poona, Satara, Western Ghats (Fraser, 1933 b); Andaman and Nicobar Islands (Lahiri and Mitra, 1993; Ram *et al.*, 2000); Andhra Pradesh (Prasad, 2007 a); Arunachal Pradesh (Lahiri, 1979); Assam (Laidlaw, 1924; Lahiri, 1979); Bihar (Prasad and Varshney, 1988); Chhattisgarh : Indravati Tiger Reserve (Mitra, 1995 c); Goa (Prasad, 1995); Jharkhand (Mitra, 2002 b); Madhya Pradesh (Mishra, 2007); Maharashtra (Kalaskar and Kalaskar, 1998; Babu and Nandy, 2010); Meghalaya (Lahiri, 1987; Mitra, 1999); Orissa (Srivastava and Das, Uttarakhand

(Prasad and Mondal, 2010), Garhwal Hills (Prasad, 1974); 1987); Sikkim (Lieftinck, 1948; Mitra, 2003 a); Tripura (Srivastava and Sinha, 2000); Uttar Pradesh (Kumar, 1982; Ram *et al.*, 1983); West Bengal (Srivastava and Sinha, 1993).

Elsewhere : Burma (Myanmar) (Laidlaw, 1924; Lieftinck, 1948); Copabo (Selys, 1891); Nepal (Asahina, 1955); Kampuchea, Thailand, Vietnam (Tsuda, 1991 and 2000).

Genus ***Agriocnemis*** Selys

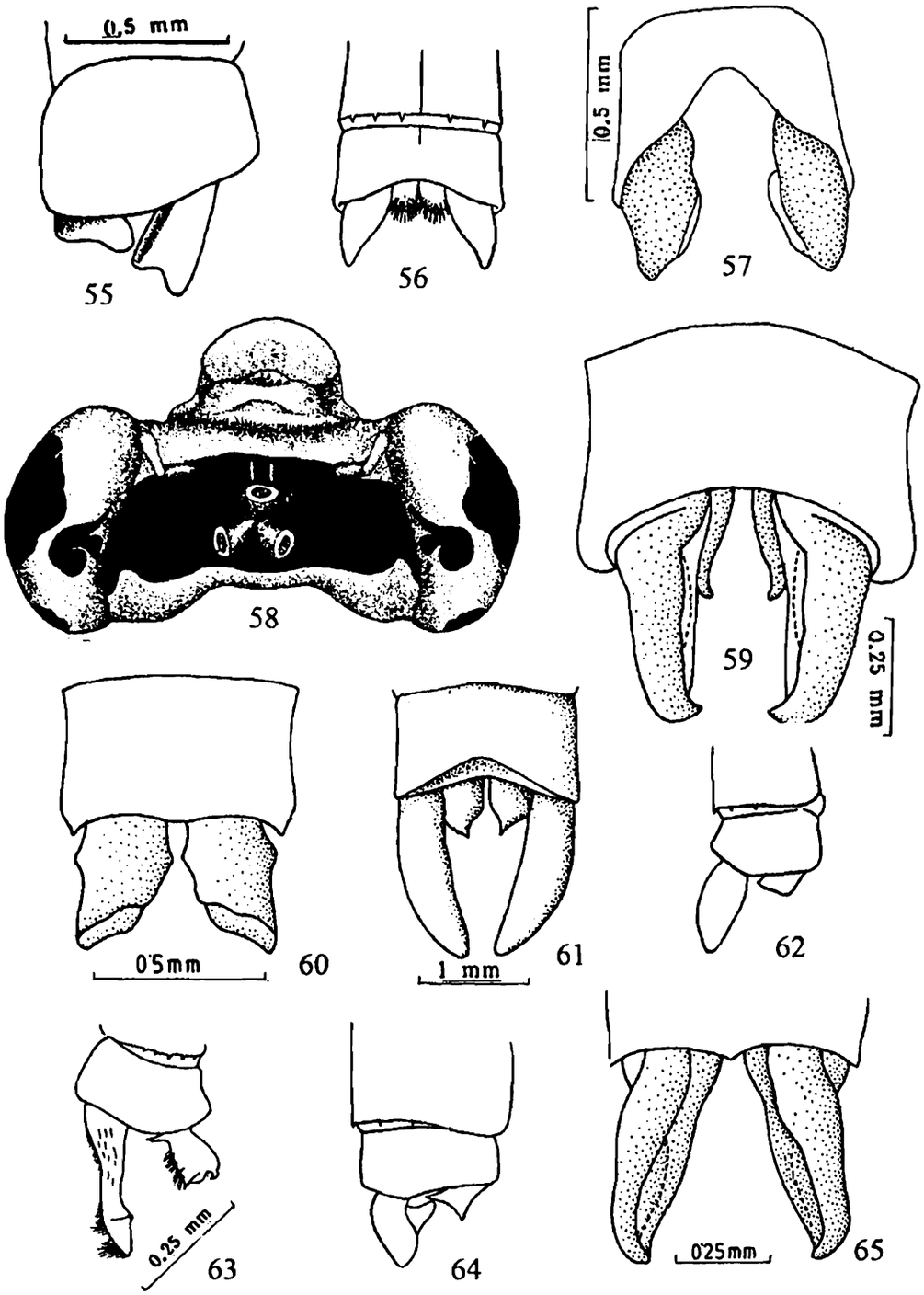
1869. Selys, *Agriocnemis, Pollen & Van Dam, Faune Madagascar, Ins.*, p. 24.

1933. Fraser, *Agriocnemis, Fauna Brit. India, Odon.*, **1** : 379-380.

Diagnostic characters: Odonata of smallest size and slender built, colour non-metallic, usually black marked with blue or black, abdomen terminating with bright ochreous. Females polychromatic. Head narrow, without any frontal ridge; postocular coloured spots present; posterior lobe of prothorax simple, but variable in the species, helps in identification of females; thorax short and robust, no hook on anterior border; abdomen slim and cylindrical, dilating towards the anal segments; legs short, 4 to 5 spines on the hind pair of tibiae, usually and about 7 on the corresponding femora; segment 8 in female without any ventral spine. Wings hyaline, pterostigma similar or dissimilar in fore and hind-wings, very small, covering less than one cell, diamond shaped; but distal side more oblique than proximal side, usually braced; postnodal nervures numbering from 5 to 6 or more rarely 9; discoidal cell acutely pointed at the distal end, with costal side rather more than half the length of the posterior in fore-wing and about three-fourths the length of the hind; basal side considerably shorter than costal side in fore-wing and only half the length of that side in the hind, distal side moderately oblique; sectors of *arc* arising from the lower end of the *arc*, divergent from their origins, *arc* situated distal to the distal antenodal nervure; *ab* always present, and complete arising well before the level of *ac,* which usually lies slightly near the level of the distal antenodal nervure; *ab* continued on as the nervure *IA*, but an angulation (medio-anal link) present at the junction of the two; in some cases medio-anal angulation in distinct; in most cases R_{4+5} arising well before the nervure descending from the subnode, IR_3 in continuation of that nervure.

Type-species: *Agriocnemis rufipes* Kirby (vide Mitra, 1983).

Distribution : American Samoa, Angola, Australia, Bangladesh, Benin, Bissau, Botswana, Centr. Afr. Republic, Cambodia, Cameroon, China, Congo, Democratic Republic of Congo, Djibouti, Egypt, Ethiopia, Fiji, Gabon, Ghana, Guam, Guinea, Guinea-Bissau, Hong Kong, India, Indonesia, Israel, Japan, Kenya, Korea, Laos, Liberia, Madagascar, Mali, Malaysia, Mauritania, Mauritius, Mozambique, Myanmar (Burma), Namibia, Nepal, Nigeria, Norfolk Island, Pakistan, Palau, Papua-New Guinea, Philippines, Reunion, Rwanda, Senegal, Seychelles, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa, Sri Lanka, Swaziland, Taiwan, Tanzania, Thailand, Uganda, Vanuatu, Vietnam, Zambia, Zimbabwe.



Figs. 55-65. 55. Left lateral view of 10th abdominal segment and anal appendages of male *Aciagrion olympicum* Laidlaw; 56. Dorsal view of 10th abdominal segment and anal appendages of male *Aciagrion approximans* (Selys); 57. Dorsal view of 10th abdominal segment and anal appendages of male *Aciagrion pallidum* Selys; 58. Markings on the head of *Agriocnemis pygmaea pygmaea* (Rambur); 59. Dorsal view of 10th abdominal segment and anal appendages of male *Agriocnemis lacteola* Selys; 60. Dorsal view of 10th abdominal segment and anal appendages of male *Agriocnemis clauseni* Fraser; 61. Dorsal view of 10th abdominal segment and anal appendages of male *Agriocnemis splendidissima* Laidlaw; 62. Right lateral view of 10th abdominal segment and anal appendages of male *Agriocnemis dabreui* Fraser; 63. Right lateral view of 10th abdominal segment and anal appendages of male *Agriocnemis femina femina* (Brauer); 64. Right lateral view of 10th abdominal segment and anal appendages of male *Agriocnemis nana* (Laidlaw); 65. Dorsal view of 10th abdominal segment and anal appendages of male *Agriocnemis pygmaea pygmaea* (Rambur)

KEY TO SPECIES OF GENUS *AGRIOCNEMIS* SELYS

MALE

1. Inferior anal appendages longer than superiors ..... *A. femina femina* (Brauer)
– Inferior anal appendages smaller than superiors 2
2. Abdomen 20 mm or more ..... *A. clauseni* Fraser
– Abdomen 18 mm or less 3
3. Segment 2 of abdomen with blue eye-spots ..... *A. nana* (Laidlaw)
– Segment 2 of abdomen without eye-spots 4
4. Labrum metallic blue ..... *A. pygmaea pygmaea* (Rambur)
– Labrum non-metallic 5
5. Abdomen white ..... *A. lacteola* Selys
– Abdomen with black markings ..... *A. splendidissima* Laidlaw
– Abdomen pale blue, marked with black ..... *A. pieris* Laidlaw

FEMALE

1. Abdomen longer than 20 mm ..... *A. clauseni* Fraser
– Abdomen smaller than 20 mm 2
2. Middle portion of prothoracic hind lobe not humped ..... *A. pygmaea pygmaea* (Rambur)
– Middle portion of prothoracic hind lobe humped 3
3. Middle portion of the hump deeply notched ..... *A. femina femina* (Brauer)
– Middle portion of the hump slightly notched 4
4. Middle portion of the hump quadriangular 5
– Middle portion of the hump slightly depressed 6
5. Hind-wing 15 mm in length ..... *A. nana* (Laidlaw)
– Hind-wing 13 mm in length ..... *A. lacteola* Selys
6. Dorsal border of prothoracic hind-lobe slightly pinkish ..... *A. pieris* Laidlaw
– Dorsal border of prothoracic hind-lobe black ..... *A. splendidissima* Laidlaw

Agriocnemis pygmaea pygmaea (Rambur)

(Figs. 58, 65, 84)

1842. Rambur, *Agrion pygmaeum, Ins. Nevrop.*, p. 278.

1933. Fraser, *Agriocnemis pygmaea, Fauna Brit. India, Odon.*, **1** : 398-401.

1983. Mitra, *Agriocnemis pygmaea pygmaea, Ent. Mon. Mag.*, **119** : 30.

1991. Tsuda, *Agriocnemis pygmaea pygmaea, A distributional list of World Odonata*, p. 19.

Material examined : Arunachal Pradesh: Sessa, 1 Male, 21.iii.1973; Assam: Damadali, 1 Female, 15.ix.1975; Goalpara, 1.Male, 23.xii.1973; Bihar: Hazaribagh, 6 Male, 29.x.1974; Mizoram: Phaileng, 3 Male, 2 Female, 23.x.1991; Orissa: Bolangir, 1 Male, 7.xi.1972; Sikkim: Rabangla, 1 Male, 1 Female, 7.x.1988; West Bengal: Calcutta, 1 Male, 19.x.1966; 1 Male, 23.x.1966; Maharashtra: Bhandara, 1 Female, 24.x.1971; 1 Male, 22.x.1971; Madhya Pradesh: Chhindwara, 1 Female, 27.xi.1971; Nicobar: 6 Male, 13-26.iii.1966; Nagaland: Zunheboto, 1 Female, 8.vii.1991; Mokokchung, Tuli, 21.ix.1994; Longcham, 1 Male, 22.ix.1994. Pakistan: Kallar Kahar Saltrange, 1 Male, 20-23.x.1930; Nam Shara Saltrange, 1 Male, 22.iv.1931.

Distribution : INDIA : Nicobar Island (Hagen, 1858; Selys, 1891); North Lakhimpur (Laidlaw, 1914); Barkuda Island (Fraser and Dover, 1922); Bolluvampattis, Cochin, Coorg, Deccan, Kanara, Malabar, Nilgiris, Travancore (Fraser, 1931); Dehra Dun, Lachiwala (Bhasin, 1953); Andaman and Nicobar Islands: Great Nicobar (Chhotani *et al.*, 1983; Hämäläinen *et al.*, 1999); Andhra Pradesh (Prasad, 2007 a); Arunachal Pradesh, (Lahiri, 1979; Mitra, 2006); Assam (Lahiri, 1979); Bihar (Prasad and Varshney, 1988); Gujarat (Prasad, 2004); Goa (Prasad, 1995; Kulkarni and Talmale, 2008 a); Himachal Pradesh (Kumar and Prasad, 1981), Simbalbara Wildlife Sanctuary (Babu and Mehta, 2009); Jharkhand (Bihar) (Prasad and Varshney, 1988; Mitra, 2002 b); Karnataka: Biligiri Rangaswamy Temple Wildlife Sanctuary, Kudremukh National Park (Emiliyamma and Radhakrishnan, 2006 b and 2007), South Western Karnataka (Subramanian *et al.*, 2008); Kerala (Emiliyamma *et al.*, 2007); Madhya Pradesh (Mishra, 2007), Sagar (Srivastava and Suri Babu, 1997); Maharashtra (Mitra, 1988; Prasad, 1996 b; Kulkarni and Talmale, 2008 b; Babu and Nandy, 2010); Manipur (Lahiri, 1977 b; Srivastava and Sinha, 2004); Mizoram (Lahiri, 1979; Prasad, 2007 b); Meghalaya (Lahiri, 1987; Mitra, 1999); Nagaland (Mitra *et al.*, 2006); Orissa (Srivastava and Das, 1987); Pondicherry (Emiliyamma and Radhakrishnan, 2006 a); Punjab Shivalik (Sharma and Kumar, 2008); Rajasthan (Bose and Mitra, 1976); Sikkim (Mitra, 2003 b); Tamil Nadu (Kumar, 1990); Tripura (Srivastava and Sinha, 2000); Uttarakhand (Prasad and Mondal, 2010), Dehra Dun (Mitra, 2000); Uttar Pradesh (Ram *et al.*, 1983); Tamil Nadu (Emiliyamma, 2009); West Bengal (Srivastava and Sinha, 1993), Calcutta (Mitra, 1983; Selys, 1891).

Elsewhere : Java, Reinbode (Hagen, 1858); Singapore (Brauer, 1864); Bhamo, Palon, Teinzo (Selys, 1891); Ceylon (Kirby, 1893; Selys, 1891); New South Wales (Ris, 1912); China (Klots, 1947; Needham, 1930; Rowe, 1981); Formosa (Needham, 1930); Africa (Pinhey, 1967); Seychelles Island (Blackman and Pinhey, 1967); Thailand (Kiauta and Kiauta, 1983 b); Afghanistan, Australia, Bangladesh, Indonesia, Japan, Kampuchea, Malaysia, Nepal, Pakistan, Papua New Guinea, Taiwan (Tsuda, 1991 and 2000); Vietnam (Cuong and Hoa, 2007).

Agriocnemis lacteola Selys
(Fig. 59)

1877. Selys, *Agriocnemis lacteola, Bull. Acad. Belg.*, (2) **43** : 144.

1933. Fraser, *Agriocnemis lacteola, Fauna Brit. India, Odon.*, **1** : 381-383.

Material examined : Arunachal Pradesh: Sitapari, 1 Female, 14.iii.1969; 3 Female, 15.iii.1969; 4 Female, 16.iii.1969; Assam: Goalpara, 1 Female, 21.xii.1973; 1 Female, 23.xii.1973; Orissa: Ganjam, 1 Male, 31.xii.1973; West Bengal: Calcutta, 2 Male, 22.xi.1966.

Distribution : INDIA : Bengal (Selys, 1877), Dibrugarh, N.E. Assam, Dejoo, North Lakhimpur (Laidlaw, 1914); Purneah (District of Bihar) (Laidlaw, 1919); Hasimara, Jalpaiguri, Margharita, Nowgang, Dibrugarh, Sikkim (Fraser, 1933 b); Arunachal Pradesh (Lahiri, 1977 a; Mitra, 2002 b); Assam (Lahiri, 1979); Bihar (Prasad and Varshney, 1988); Chhattisgarh : Bastar (Prasad, 1996 a); Goa (Prasad, 1995); Maharashtra (Babu and Nandy, 2010), Tadoba Andhari Tiger Reserve (Kulkarni *et al.*, 2006 a); Mizoram (Prasad, 2007 b); Meghalaya (Lahiri, 1987; Mitra, 1999); Orissa (Srivastava and Das, 1987); West Bengal (Srivastava and Sinha, 1993; Mitra, 1983 and 2002 b).

Elsewhere : China (Klots, 1947; Needham, 1930); Thailand (Asahina, 1982); Bangladesh, Hong Kong, Nepal (Tsuda, 1991 and 2000); Vietnam (Cuong and Hoa, 2007).

Agriocnemis pieris Laidlaw

1919. Laidlaw, *Agriocnemis pieris, Rec. Indian Mus.*, **16** : 179-180.

1933. Fraser, *Agriocnemis pieris, Fauna Brit. India, Odon.*, **1** : 384-385.

Material examined : Western Ghats: Anaimalai Hills, 1 Male, 12.viii.1929; West Bengal: Calcutta, 2 Female, 23.x.1966; 2 Female, 27.xi.1966; Madhya Pradesh: Kutru, 5 Female, 1.ii.1990.

Distribution : INDIA : Bombay (Laidlaw, 1914); North Kanara (Laidlaw, 1919); Coorg, Malabar, Wyanad (Fraser, 1924 a); Nilgiris (Fraser, 1931); Western Ghats, South Kanara (Fraser, 1933 b; Subramanian, 2007); Arunachal Pradesh (Ram and Prasad, 1999; Mitra, 2002 b); Chhattisgarh : Indravati Tiger Reserve (Mitra, 1995 c); Goa (Prasad, 1995); Karnataka: Kudremukh National Park (Emiliyamma and Radhakrishnan, 2007); Kerala (Emiliyamma *et al.*, 2007), New Amarambalam Reserve Forests (Rao and Lahiri, 1982); Maharashtra (Prasad, 1996 b; Babu and Nandy, 2010); Mizoram (Prasad, 2007 b); Tamil Nadu (Emiliyamma, 2009); West Bengal: Calcutta (Lahiri and Mitra, 1976; Mitra, 1983).

Agriocnemis clauseni Fraser
(Fig. 60)

1922. Fraser, *Agriocnemis clauseni, Mem. Dept. Agric. India (Ent.)*, 7 (7): 53-55.

1933. Fraser, *Agriocnemis clauseni, Fauna Brit. India, Odon.*, **1** : 390-392.

Material examined : Assam-Meghalaya road, 1 Male, 6.iv.1973.

Distribution : INDIA : Assam, Bengal (Fraser, 1933 b; Mitra, 2002 b); Arunachal Pradesh (Prasad, 1997 b; Mitra, 2002 b and 2006); Meghalaya (Lahiri, 1987; Mitra, 1999); Uttarakhand (Kumar and Prasad, 1981), Dehra Dun (Mitra, 2000).

Elsewhere : Burma (Myanmar) (Fraser, 1933 b; Bhasin, 1953); Bangladesh, Nepal, Thailand (Tsuda, 1991 and 2000).

Agriocnemis splendidissima Laidlaw
(Fig. 61)

1919. Laidlaw, *Agriocnemis splendidissima, Rec. Indian Mus.*, **16** : 180-182.

1933. Fraser, *Agriocnemis splendidissima, Fauna Brit. India, Odon.*, **1** : 392-394.

Material examined : Assam: Barpeta, 1 Male, 4.iv.1986; Goalpara, 1 Male, 1 Female, 13.vi.1973; 1 Female, 20.vi.1973; Orissa: Ganjam, 1 Female, 14.iii.1974; Tripura: Teliamura, 1 Male, 1 Female, 12.ix.1974.

Distribution : INDIA : Kanara, Talewadi, Chalakudi, Cochin (Laidlaw, 1919); Coorg, Malabar (Fraser, 1931); Nilgiris, Wyanad, Mhow, Poona, Khandala (Fraser, 1933 b); Andhra Pradesh (Prasad, 2007 a); Assam (Mitra, 2002 b); Gujarat (Prasad, 2004); Jharkhand (Bihar) (Prasad and Varshney, 1988); Karnataka: Kudremukh National Park (Emiliyamma and Radhakrishnan, 2007); Kerala (Emiliyamma *et al.*, 2007), Silent valley and New Amarambalam Reserve Forests (Rao and Lahiri, 1982); Madhya Pradesh (Mishra, 2007), Sagar (Srivastava and Suri Babu, 1997); Maharashtra (Prasad, 1996 b; Babu and Nandy, 2010); Orissa (Mitra, 2002 b); Tamil Nadu (Emiliyamma, 2009); Tripura (Mitra, 1994; Srivastava and Sinha, 2000); West Bengal (Srivastava and Sinha, 1993), Hooghly, Howrah (Ram *et al.*, 1982).

Elsewhere : Pakistan (Tsuda, 1991 and 2000).

Agriocnemis dabreui Fraser
(Fig. 62)

1919. Fraser, *Agriocnemis dabreui, Rec. Indian Mus.*, **16** : 454-455.

1933. Fraser, *Agriocnemis dabreui, Fauna Brit. India, Odon.*, **1** : 396-398.

Material examined : Madhya Pradesh: Bastar, Kutru, 1 Male, 2 Female, 1.ii.1990.

Distribution : INDIA : Lamta, Balaghat (Fraser, 1919 a); Gauhati, Jorghat (Fraser, 1933 b); Andhra Pradesh (Prasad, 2007 a); Chhattisgarh : Indravati Tiger Reserve (Mitra, 1995 c); Madhya Pradesh (Mishra, 2007), Sagar (Srivastava and Suri Babu, 1997).

Elsewhere : Burma (Fraser, 1933 b); Malaysia (Lieftnick, 1954); Thailand, Vietnam (Tsuda, 1991 and 2000).

Agriocnemis femina femina (Brauer)
(Fig. 63)

1868. Brauer, *Agrion (Ischnura) femina, Verh. zool-bot. Ges. Wein*, **18** : 554.

1890. Kirby, *Agriocnemis femina, Syn. Cat. Odon.*, p. 158.

1933. Fraser, *Agriocnemis femina, Fauna Brit. India, Odon.*, **1** : 402-404.

1983. Chhottani *et al., Agriocnemis femina oryzae, Rec. zool. Surv. India*, **80** : 479.

2002. Mitra, *Agriocnemis femina femina, Mem. zool. Surv. India*, **19** (1) : 82.

Material examined : Assam: Goalpara, 1 Female, 21.xii.1973; 4 Male, 2 Female, 23.xii.1973; Andaman Island: Hopetown, Ponighat, 1 Male, 27.viii.1928; Dennipoint, 1 Male, 3.ix.1928; Mannar Ghat, Wright Myo, 1 Male, 25.iii.1964; Bibliaganj, Port Blair and Wright Myo, 21 Male, 12 Female, March-April, 1969; Manipur: Moirang, 2 Male, 3 Female, 16-19.iii.1974.

Distribution : INDIA : Dibrugarh, N.E. Assam (Laidlaw, 1914); Assam, Bengal (Fraser, 1933 b); Sibsagar (Bhasin, 1953); Andaman and Nicobar Islands (Chhotani *et al.*, 1983; Ram *et al.*, 2000), Great Nicobar (Mitra, 1995 a; Hämäläinen *et al.*, 1999); Andhra Pradesh (Prasad, 2007 a); Assam (Mitra, 2002 b); Maharashtra (Prasad, 1996 b; Babu and Nandy, 2010); Manipur (Mitra, 2002 b); Tamil Nadu (Emiliyamma, 2009).

Elsewhere : Cuba (Hagen, 1867); Burma (Bhasin, 1953; Fraser, 1933 b); China (Klots, 1947; Needham, 1930); Formosa (Needham, 1930); Boraeo, Celebes, Java (Fraser, 1933 b); Micronesia (Lieftinck, 1962); New Guinea (Ris, 1930); Philippines (Kiauta and Kiauta, 1983 b); Australia, Bangladesh, Singapore, Vietnam (Tsuda, 1991 and 2000).

Agriocnemis nana (Laidlaw)
(Fig. 64)

1914. Laidlaw, *Argiocnemis nana, Rec. Indian Mus.*, **8** : 348.

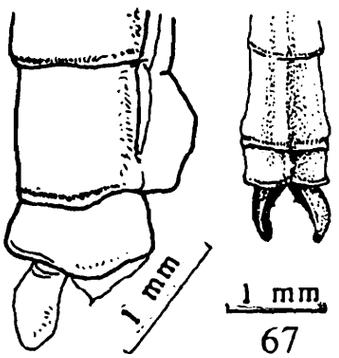
1930. Lieftinck, *Agriocnemis nana, Treubia*, **12** : 153-155.

1933. Fraser, *Agriocnemis nana, Fauna Brit. India, Odon.*, **1** : 386-387.

Material examined : West Bengal : Calcutta, 3 Male, 3 Female, 13.xi.1970.

Distribution : INDIA : West Bengal : Calcutta (Mitra and Lahiri, 1980).

Elsewhere : Burma (Myanmar) (Fraser, 1933 b; Laidlaw, 1914; Lieftinck, 1948); Malaysia, Pakistan, Singapore, Thailand (Tsuda, 2000).



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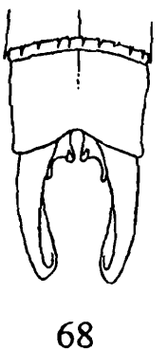

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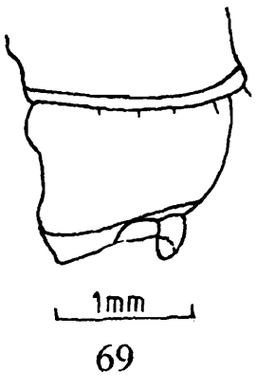

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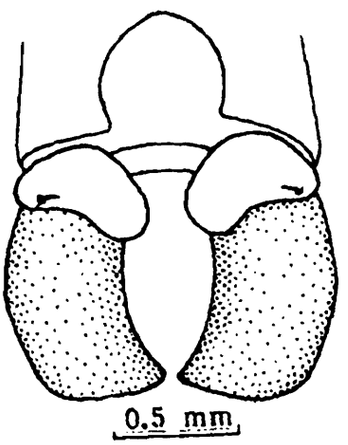

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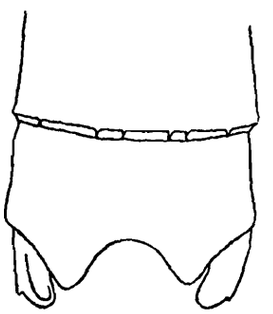

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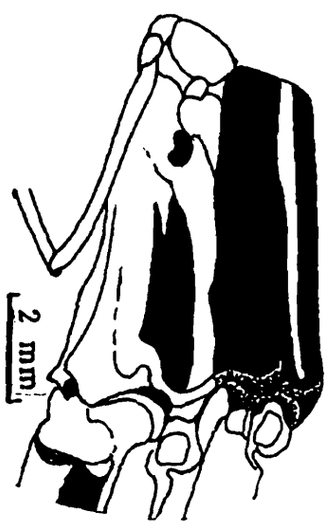

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Figs. 66-72. 66. Right lateral view of 9th and 10th abdominal segment and anal appendages of male *Mortonagrion aborense* (Laidlaw); 67. Dorsal view of 10th abdominal segment and anal appendages of male *Mortonagrion aborense* (Laidlaw); 68. Dorsal view of 10th abdominal segment and anal appendages of male *Argiocnemis rubescens rubeola* Selys; 69. Right lateral view of 10th abdominal segment and anal appendages of male *Paracercion calamorum dyeri* (Fraser); 70. Dorsal view of 10th abdominal segment and anal appendages of male *Enallagma parvum* Selys; 71. Dorsal view of 10th abdominal segment and anal appendages of male *Onychargia atrocyana* Selys; 72. Left lateral view of markings on thorax of *Onychargia* sp. indet.

REMARKS ON *AGRIOCNEMIS CORBETI* KUMAR and PRASAD AND *AGRIOCNEMIS KERALENSIS* PETER

Both species have been described on the basis of immature individuals. To us they appear junior synonym of *Agriocnemis pygmaea* Rambur (= *A. corbeti*) and *Agriocnemis splendidissima* Laidlaw (= *A. keralensis*) respectively. The shape and size of anal appendages, wing characters agree with immature forms of *Agriocnemis pygmaea* and *A. splendidissima*. Moreover Type specimens are not available.

Agriocnemis nainitalensis Sahni

1965. Sahni, *Agriocnemis nainitalensis, Indian J. Ent.*, **27** : 206-207.

Mitra (1992) has already synonymised it to *Ischnura senegalensis* (Rambur), on the basis of comparative study of *I. senegalensis* and *I. forcipata* contradicting Hämäläinen's contention which was followed by Prasad and Varshney (1995).

Genus ***Mortonagrion*** Fraser

1920 Fraser, *Mortonagrion, J. Bombay nat. Hist. Soc.*, **27** : 148.

1933 Fraser, *Mortonagrion, Fauna Brit. India, Odon.*, **1** : 408-409.

Diagnostic characters: Small, slender built Odonates, colour non-metallic; postocular spots may or may not be present; posterior lobe of prothorax middle portion produced in like a rounded arch similar to middle lobe of female of certain *Agriocnemis*; wings hyaline, similar to *Agriocnemis,* the medio-anal link (junction of *ab* and *IA*) may or maynot be angulated. Abdomen slim, cylindrical, very slightly dilated at the end segments. Anal appendages: superiors usually digitate, the inferiors without a ventral spine, tapering to a point and sloping upwards, segments 8 of female without a ventral spine.

Type-species : *Mortanagrion varalli* Fraser.

Distribution : China, Congo, India, Indonesia, Japan, Malaysia, Myanmar, Papua New Guinea, Russia, Sri Lanka, Thailand, Zaire.

KEY TO SPECIES OF GENUS *MORTONAGRION* FRASER

1. Thorax black on dorsum to as far as the anterolateral suture .....
.....*M. aborense* (Laidlaw)

– Thorax pale reddish-brown on dorsum as far as the anterolateral suture .....
..... *M. varalli* Fraser

Mortonagrion aborense (Laidlaw)
(Figs. 66, 67)

1914. Laidlaw, *Agriocnemis aborensis, Rec. Indian Mus.*, **8** : 347.

1933. Fraser, *Agriocnemis aborensis, Fauna Brit. India, Odon.*, **1** : 394-395.

1989. Hämäläinen, *Mortonagrion aborense, Indian Odonatol.*, **2** : 1-4.

Material examined : Mizoram: Terei, 1 Male, 25.x.1991.

Distribution : INDIA : Abor Hills (Laidlaw, 1914); Duars of Bengal (Fraser, 1933 b); Mizoram (Mitra, 2002 b).

Elsewhere : Indonesia, Thailand (Tsuda, 1991 and 2000).

Remarks : The specimen we studied clearly agree with the description of *Agriocnemis aborensis* provided by Fraser (1933 b), hence we accept Dr. Hämäläinen's contention with reservation pending further collection of more specimens.

Mortonagrion varalli Fraser

1920. Fraser, *Mortonagrion varalli, J. Bombay nat. Hist. Soc.*, **27** : 148.

1933. Fraser, *Mortonagrion varalli, Fauna Brit. India, Odon.*, **1** : 409-411.

No specimen could be examined.

Distribution : INDIA : Western Ghats (Fraser, 1933 b); Goa (Kulkarni and Talmale (2008 a); Kerala (Palot and Soniya, 2004; Emiliyamma *et al.*, 2007).

Mortonagrion gautama (Fraser)

1922. Fraser, *Indagrion gautama, Mem. Dept. Agric. India (Ent.)*, **3** (7): 50.

1933. Fraser, *Mortonagrion gautama, Fauna Brit. India, Odon.*, **1** : 411-415.

No specimen could be examined.

Hämäläinen (1989 a) synonymised it with *M. aborense* (Laidlaw).

REMARKS ON THE RELATIONSHIP BETWEEN *AGRIOCNEMIS* SELYS AND *MORTONAGRION* FRASER

Pinhey (1974 b) wrote on *Mortonagrion* Fraser as follows: "*It was stated in the introductory section on taxonomy that the main difference between Agriocnemis and Mortonagrion according to Fraser is that the medio-anal link cross-vein is angulated to the anal vein in Agriocnemis but continuous with it in Mortonagrion. According to Ris (1930) and Fraser (1957) this continuation of ac and the anal vein is an evolutionary advance. Yet it is evidently an inconstant factor as Lieftinck has confirmed. It should be further noted that Fraser placed the African species M. stygium in Agriocnemis in 1954, later transferring it to Mortonagrion in 1957 when he had considered the un-named Zaire species recorded by Schouteden (1934). It is also of interest that M. hirosei Asahina (1972, Kontyu 40 (4): 11-16 figs.) is essentially similar in anal appendages and prophallus to the gratiosa section of the exilis group, although the body pattern is very different. Yet inversa is a true Agriocnemis. Lieftinck and others, however, regard Mortonagrion as a valid genus on pattern and the shape of the appendages.*" Pinhey (*op. cit.*) stated, "*It has not been possible to examine the type species but notes on a few species can be recorded, apart from M. stygium, M. selenion Ris of Japan, and four Indonesian species kindly loaned by*

Rijks-Museum van Natuurlijke Histoire, Leiden, through the auspices of Dr. Lieftinck. These are M. simile Ris (1930) S. Sumatra, M. amoenum Ris (1915) S.W. Java, M. falcatum Lieftinck (1934) Billiton and M. appendiculatum Lieftinck (1937) Billiton" Pinhey observed that the region of the medio-anal link of these five species merely show the inconsistency of the junction of these veins. He could not get any female example and the males were juvenile. Taking a queue to Pinhey's observations it is reported here that Mitra and Lahiri (1980) showed the inconstancy of the angulation of the medio-anal link in *Agriocnemis dabreui* (later on corrected as *A. nana* by Dr. Lieftinck). Hämäläinen (1989) reported that he studied type specimens of several species in the British Museum (Natural History) and transferred *Agriocnemis aborensis* to *Mortonagrion aborense.* In addition to the study of anal crossing Pinhey compared several morphological features of different species and concluded, *"From all these selected comparisons there seems no constant feature to separate Mortonagrion from Agriocnemis"*

From the above facts, it is proposed that, with due regards to the late Dr. M.A. Lieftinck, Dr. S. Asahina and others, we should agree with the opinion of the late Dr. E.C.G. Pinhey in the matter.

Genus ***Argiocnemis*** Selys

1877. Selys, *Argiocnemis, Bull. Acad. Belg.*, (2) **43** : 135.

1933. Fraser, *Argiocnemis, Fauna Brit. India, Odon.*, **1** : 405-406.

Diagnostic characters : Head narrow, without any frontal ridge; postocular coloured spots present; posterior lobe of prothorax simple; no hook on anterior border of thorax. Wings hyaline, pterostigma similar in fore and hind-wings; small covering about one cell, nearly twice as long as broad, distal side oblique; 10-12 postnodals; discoidal cell acutely pointed at the distal end, with costal side about half the length of posterior in the fore-wing and about three –fourths in the hind; basal side equal to costal in the fore-wing, nearly half the length in the hind; distal side oblique. Sectors of *arc* arising from the lower end of the *arc*, divergent from origin; *arc* situated distal to the level of the distal antenodal nervure, *ab* always present and complete arising well before the level of *ac*; *ac* lies between two antenodals; *ab* produces an angulation at the junction of *IA*. Till date no controversial case has been discovered as in the cases of *Argiocnemis* and *Mortonagrion*. R_{4+5} well proximal to the level of the oblique nervure descending from the sub node; IR_3 in continuation of that nervure. Abdomen slim and cylindrical, dilating towards the anal segments. Anal appendages: superiors about as long as segment 10, rather broad and obtuse, curving slightly downwards when seen in profile; inferiors shorter, very small and aborted. Genitalia: lamina deeply and narrowly cleft; hamules square plate like structures almost meeting across the middle line; lobe small, scortum shaped.

Type-species : *Argiocnemis rubescens* Selys.

Distribution : Australia, Bangladesh, Cameroon, India, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam.

Argiocnemis rubescens rubeola Selys
(Figs. 68, 85)

1877. Selys, *Argiocnemis rubescens, Bull. Acad. Belg.*, (2) **43** : 136.

1877. Selys, *Argiocnemis rubeola, Bull. Acad. Belg.*, (2) **43** : 137.

1933. Fraser, *Argiocnemis rubescens, Fauna Brit. India, Odon.*, **1** : 406-408.

1991. Tsuda, *Argiocnemis rubescens rubeola, A distributional list of World Odonata*, p. 25.

Material examined : Arunachal Pradesh: Namdhapa Biosphere Reserve, 2 Male, 20.iv.1981; 2 Male, 1 Female, 6.iv.1981.

Distribution : INDIA : Dejoo, North Lakhimpur (Laidlaw, 1914); Assam, Bengal (Fraser, 1933 b); Andaman Island (Lahiri and Mitra, 1993); Arunachal Pradesh (Lahiri, 1985); Manipur (Srivastava and Sinha, 2004); Meghalaya (Lahiri, 1987); Tamil Nadu (Emiliyamma, 2009).

Elsewhere : Bangladesh, Indonesia, Malaysia, Myanmar (Tsuda, 2000); Vietnam (Cuong and Hoa, 2007).

Remarks : Lahiri's (1987) contention that Laidlaw's (1914) *Argiocnemis obscura* from Burma (Myanmar) is a distinct species is wrong.

Genus ***Coenagrion*** Kirby

Fraser (1933 b) reported *Coenagrion dyeri* from India. The species later on named as *Cercion calamorum dyeri* (Fraser). Status of the species has been discussed in the section dealing with *Paracercion.*

Chowdhurry and Das (1975) reported a new species *Coenagrion kashmirensis* from Kashmir in the Abstract of the *Third All India Congress of Zoology*, Waltair. But after that no description of the species was available. As per code any taxon reported in the form of Abstract is not a recognized taxon. Hence for the present, *it is considered that the species does not occur.*

Genus ***Enallgma, Coenagrion, Cercion, Paracercion***

Fraser (1933 in *Fauna of British India*) reported *Enallagma cyathigerum, Enallagma parvum, Enallagma malayanum, Enallagma insule* under the genus *Enallagma. Coenagrion dyeri* under *Coenagrion.* Later on authorities merged *Enallagma malayanum* and *Coenagrion dyri* to *Cercion malayanum* and *Cercion calamorum dyeri.*

Weekers and Dumont (2004) on the basis of molecular study of the relationship between coenagrionid genera, synonymised *Cercion lindeni* the type species of *Cercion* to *Erythromma* for West palaearctic species and for Eastern Asia including India they described new genus *Paracercion.* Hence *Cercion malayanum* is now *Paracercion malayanum, Cercion calamorum dyeri* is *Paracercion calamorum dyeri.* Dumont (2004) clearly mentioned the distinguishing characters of East-Asiatic representatives of *Paracercion.*

Genus ***Paracercion*** Weekers & Dumont

2004. Weekers and Dumont *Paracercion, Odonatologica,* **33** (4) : 181-188.

Diagnostic characters : Unlike *Erythromma* these species has non forcipate, non bifid superior appendage, and non acutely pointed basal tooth descending between the inferior appendages. Females have lower apophysis at the mid-hind ridges of the prothorax.

Type-species : *Paracercion hieroglyphicum* (Brauer, 1865).

Distribution : East Asia (China, India, Japan, Korea, Mongolia).

KEY TO SPECIES OF GENUS *PARACERCION* WEEKERS & DUMONT

1. 7-8 postnodals in fore-wings; 6-7 in hind-wings; thorax with greenish-yellow antehumeral stripe .....*P. malayanum* (Selys)

– 9-10 postnodals in fore-wings; 7-8 postnodals in hind-wings; azure blue antehumeral stripe in male and narrow green antehumeral stripe in female ....*P. calamorum dyeri* (Fraser)

Paracercion malayanum (Selys)

1876. Selys, *Enallagma malayanum, Bull. Acad. Belg.*, (2) **4** : 536.

1933. Fraser, *Enallagma malayanum, Fauna Brit. India, Odon.*, **1** : 375-376.

1954. Lieftinck, *Coenagrion malayanum, Treubia*, **22** (suppl.): 69.

1975. Kiauta, *Cercion malayanum, Cytotaxonomy of dragonflies,* p. 43.

Material examined : Manipur: Ukhrul, 1 Male, 3.x.1975; Rajasthan: Phulera, 1 Female, 19.xii.1956; 1 Male, 6.xii.1956; West Bengal: Calcutta, 1 Female, 8.viii.1966; 2 Male, 7.ix.1966; 1 Female, 22.ix.1966. Pakistan: Kallar Kahar Saltrange, 1 Female, 20-23.x.1930.

Distribution : India : Nagpur (Fraser, 1933 b; Laidlaw, 1919); Madhya Pradesh (Mishra, 2007), Sagar (Srivastava and Suri Babu, 1997); Maharashtra (Prasad, 1996 b; Babu and Nandy, 2010); Manipur (Mitra, 2002 b); Rajasthan (Bose and Mitra, 1976); West Bengal (Srivastava and Sinha, 1993), Calcutta (Lahiri and Mitra, 1976).

Elsewhere : Myanmar (Bhasin, 1953); Ceylon (Sri Lanka) (Fraser, 1933 b); China (Needham, 1930); Java (Fraser, 1933 b; Schmidt, 1934); Nepal (Kiauta, 1974 and 1975); Thailand (Kiauta and Kiauta, 1982 b); Pakistan (Mitra and Babu, 2009).

Paracercion calamorum dyeri (Fraser)
(Figs. 69, 86)

1919. Fraser, *Argiocnemis gravelyi, Rec. Indian Mus.*, **16** : 451.

1919. Fraser, *Argiocnemis dyeri, Rec. Indian Mus.*, **16** : 451-452.

1933. Fraser, *Coenagrion dyeri, Fauna Brit. India, Odon.*, **1** : 413-415.

1984. Lieftinck, *Cercion calamorum dyeri, Cat. Taiwanese Dragonflies*, p. 23.

2000. Tsuda, *Cercion calamorum dyeri, A distributional list of World Odonata*, p. 27.

Material examined : Orissa: Bolangir, 1 Female, 9.xi.1972; 2 Female, 14.xi.1972; Chilka Lake, 1 Female, 19.iii.1966; Sundergarh, 1 Male, 21.ix.1972; West Bengal: Maldah, 1 Male, 13.x.1988. Pakistan: Kallar Kahar Saltrange, 1 Male, 1 Female, 20-23.x.1930.

Distribution : India : Ranchi (Fraser, 1924 b); Central Provinces (Fraser, 1919 a); Coorg, Deccan, Malabar, Nilgiris (Fraser, 1931); Western Ghats (Fraser, 1933 b); Bihar (Jharkhand) (Prasad and Varshney, 1988); Gujarat (Prasad, 2004); Himachal Pradesh (Kumar and Prasad, 1981); Kerala (Emiliyamma *et al.*, 2007); Madhya Pradesh (Mishra, 2007); Orissa, (Mitra, 2002 b); Tamil Nadu (Emiliyamma, 2009); Uttarakhand (Prasad and Mondal, 2010), Dehra Dun (Mitra, 2000); West Bengal (Srivastava and Sinha, 1993; Mitra, 2002 b).

Elsewhere : Burma, China, Korea, Sumatra (Asahina, 1960); Malaysia (Lieftinck, 1954 and 1960); Nepal (Tsuda, 1991 and 2000); Pakistan (Mitra and Babu, 2009).

Remarks : Fraser (1919 b) described *Argiocnemis gravelyi* first and it was followed by *A. dyeri* by him. But Fraser (1933 b) acted as discoverer and First reviser and used *dyeri* as the valid name suppressing priority of *gravelyi*. Hence *dyeri* has been accepted. Prasad and Varshney (1995) reported *C. calamorum* (Ris, 1916) but it is a complex and in India occurs *P. calamorum dyeri* (Fraser).

Genus ***Enallagma*** Charpentier

1840. Charpentier, *Enallagma, Lib. Europ.*, p. 21.

1933. Fraser, *Enallagma, Fauna Brit. India, Odon.*, 1 : 371-372.

Diagnostic characters: Head narrow, without any frontal ridge, postocular spots present, but often elongated and confluent across the occiput, posterior lobe of prothorax usually simply rounded, and anterior border of thorax without hooks. Abdomen short and slender, slightly tumid at base and again at terminal segment 8; in female with a strong ventral spine; anal appendages variable. Wings hyaline, pterostigma of fore and hind-wings are similar; braced and covering about one cell or less; 8 to 15 postnodals in fore-wings; 6 to 10 in the hind-wings; discoidal cell acutely pointed at the distal end, costal side less than half the length of the posterior in the fore-wings and in the hind-wings about half the length; basal side of the same length as, or shorter than, costal side in fore-wing, of the same length or only two-thirds the length in the hind-wing; *arc* situated at the level of the distal antenodal nervure; *ab* always present and complete, arising proximal to the level of *ac*; *ac* usually lies between two antenodals and may be nearer to the proximal one; *ab* continued on as *IA*, but at the junction of the two an angulation exists; R_{4+5} arising well before the oblique nerve descending from the node; IR_3 in continuation of that nervure.

Type-species : *Enallagma cyathigerum* Charpentier.

Distribution : Afghanistan, America, Cameroon, Caucasus, Cuba, Germany, India, Madagascar, Maldives, Mongolia, Pakistan, Rhodesia, Russia, Sri Lanka, Zanzibar.

KEY TO SPECIES OF *ENALLAGMA* CHARPENTIER

1. Abdomen 25-28 mm; hind-wing 18-21mm in male; abdomen 20 mm; hind-wing 15 mm in female..... *E. cyathigerum cyathigerum* Charpentier

– Abdomen 17-18 mm; hind-wing 11-12 mm in both sexes .....*E. parvum* Selys

Enallagma parvum Selys
(Fig. 70)

1876. Selys, *Enallagma parvum, Bull. Acad. Belg.*, (2) **41** : 537.

1933. Fraser, *Enallagma parvum, Fauna Brit. India, Odon.*, **1** : 376-378.

Material examined : Assam: Barpeta, 1 Male, 10.iv.1986; Bihar: Hazaribagh, 1 Male, 29.x.1974; Manipur: Ukhrul, 1 Female, 3.x.1975; Orissa: Bolangir, 1 Male, 16.xi.1972; West Bengal: Calcutta, 1 Male, 5.iii.1967; 1 Male, 11.xi.1966; 1 Male, 27.xi.1966; 1 Female, 8.viii.1967; 1 Male, 5.vi.1967; Maharashtra: Bhandara, 1 Male, 24.x.1971; 1 Female, 28.x.1971; 2 Female, 1 Male, 1 Female (in tandem) 29.x.1971. Pakistan : Sind, Shah Hasan, 1 Male, —.xi.1927; Saidan Shah Saltrange, 1 Male, 1.v.1931; Bubak, 1 Male, 25.x.1931.

Distribution : INDIA : Western Ghats (Fraser, 1924 a); Assam, Sikkim, Duars of West Bengal (Fraser, 1933 b); Andhra Pradesh (Prasad, 2007 a); Assam (Mitra, 2002 b); Chhattisgarh : Bastar (Prasad, 1996 a); Gujarat (Prasad, 2004); Jharkhand (Bihar) (Mitra, 2002 b); Madhya Pradesh (Mishra, 2007); Maharashtra (Prasad, 1996 b; Kulkarni and Prasad, 2005; Kulkarni *et al.*, 2006 a; Babu and Nandy, 2010); Manipur (Mitra, 2002 b; Srivastava and Sinha, 2004); Meghalaya (Lahiri, 1987; Mitra, 1999); Orissa (Mitra, 2002 b); Punjab Shivalik (Sharma and Kumar, 2008); Tamil Nadu (Emiliyamma, 2009); Tripura (Srivastava and Sinha, 2000); Uttarakhand (Kumar and Prasad, 1981; Prasad and Mondal, 2010), Dehra Dun (Mitra, 2000); Uttar Pradesh (Ram *et al.*, 1983); West Bengal (Srivastava and Sinha, 1993; Mitra, 2002 b), Calcutta (Lahiri and Mitra, 1976).

Elsewhere : Burma (Myanmar), Sri Lanka (Lieftinck, 1971); Nepal (St. Quentin, 1970); Thailand (Tsuda, 2000); Pakistan (Khaliq and Yousuf, 1993 b; Mitra and Babu, 2009).

NOTE ON *ENALLAGMA PARVUM* (SELYS)

Fraser's (1933 b) figures of the species have been accepted by all. But Asahina (1965) listed the species under *Cercion* without citing reason. Dumont (2004) reported that his examination of series of male examples from India reveal that they all lack structural characters of *Paracercion,* in particular, the basal tooth of the superior appendix and the individual appendix therof. Similar observations were made by us. Considering the above facts tentatively the status quo of the genus is maintained here.

Enallagma cyathigerum cyathigerum Charpentier
(Fig. 87)

1840. Charpentier, *Enallagma cyathigerum, Lib. Europ.*, p. 163.

1933. Fraser, *Enallagma cyathigerum, Fauna Brit. India, Odon.*, 1 : 373-375.

2000. Tsuda, *Enallagma cyathigerum cyathigerum, A distributional list of World Odonata*, p. 32.

Material examined : Pakistan : Sind, Shah-Hassan, 1 Male, —.xi.1927.

Distribution : INDIA : Kashmir (Fraser, 1933 b); Gujarat (Prasad, 2004); Himachal Pradesh (Kumar, 2005); Manipur (Srivastava and Sinha, 2004).

Elsewhere : Alaska, Albania, Austria, Belarus, Bulgaria, Belgium, Canada, China, Check and Slovakia, Croatia, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Korea, Lichtenstein, Lithuania, Luxembourg, Latvia, Morocco, Mexico, Macedonia, Netherlands, Norway, Pakistan, Poland, Romania, Russia, Slovenia, Switzerland, Turkey, Ukraine, United Kingdom, United States (Tsuda, 2000); Tibet (Fraser, 1933 b).

Enallagma insulae Fraser

1920. Fraser, *Enallagma insulae, Rec. Indian Mus.*, **19** : 32-33.

1933. Fraser, *Enallagma insulae, Fauna Brit. India, Odon.*, 1 : 378-379.

The species was described on the basis of a single female example in 1920. Since then no specimen of either sex has yet been collected, although several collecting team from Zoological Survey of India visited the Chilka Lagoon several times. Mitra (2000) cast doubt on its taxonomic status. In the present study it is being considered as an abnormal specimen on whom the species was described. *Hence pending further collection it should be considered that the species does not exist at all.*

Enallagma risi Schmidt

1961. Schmidt, *Enallagma risi, Beitr. Naturk. Forsch SW-Dtschl.*, **19** : 409.

1997. Steinmann, *Enallagma risi,World Catalogue of Odonata- I, Das Tierreich Teilband*, **110** : 258.

2000. Tsuda, *Enallagma risi, A distributional list of World Odonata*, p. 33.

Distribution : INDIA : Jammu and Kashmir : Ladakh, Shey (Asahina, 1978.

Elsewhere : Afghanistan, China, Russia (Isuda, 2000).

Genus ***Archibasis*** Kirby

1890. Kirby, *Archibasis, Cat. Odon.*, p. 156.

1933. Fraser, *Archibasis, Fauna Brit. India, Odon.*, 1 : 307-308.

Diagnostic characters: Head narrow, very small, with or without postocular spots or areas, thorax moderately robust, posterior lobe of prothorax in male crenate or

arched and in the female furnished with two small spines sloping strongly forwards and lying almost prone on the middle lobe. Wings narrow, hyaline, pterostigma similar in the fore and hind-wings, subquadrate, distal side slightly convex, proximal side oblique, braced, covering about one cell; postnodals numbering from 13 to 16 in the fore-wings; discoidal cell acutely pointed at the distal end, its costal side about one-fourth the length of posterior in fore-wings, about one-half or less in the hind, *arc* in the line with the distal antenodal nervure; *ab* arising from the posterior border of wing at the point *ac* meets it, or fusing with the hinder border slightly distal to *ac*, *ab* continued on as *IA*, but the junction of the two nervures strongly angulated, R_{4+5} arising slightly before the level of nervure descending from subnode; IR_3 in continuation of that nervure; *ac* situated much nearer the level of the distal antenodal nervure. Abdomen long, superior anal appendages about as long as segment 10, rounded or slightly notched at apex hollowed out on the innerside, inferior appendages half the length of superiors, small cone or club shaped organs.

Type-species: *Archibasis melanocypha* (Selys).

Distribution : Afghanistan, Australia, Brunei Darussalam, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar (Burma), Papua New Guinea, Philippines.

Archibasis oscillans (Selys)

1877. Selys, *Stenobasis oscillans, Bull. Acad. Belg.*, (2) **43** : 108-109.

1933. Fraser, *Archibasis mimetes praeclara, Fauna Brit. India, Odon.*, **1** : 310-312.

1949 Lieftinck, *Archibasis oscillans, Nova Guinea*, **5** : 185.

1991 Tsuda, *Archibasis oscillans, A distributional list of World Odonata*, p. 21.

No specimen could be examined.

Distribution : INDIA : Western Ghats (Fraser, 1933 b; Subramanian, 2007); Kerala (Emiliyamma *et al.*, 2007).

Elsewhere : Indonesia, Kampuchea, Laos, Thailand (Tsuda, 2000).

Archibasis sushmaea Baijal

1955. Baijal, *Archibasis sushmaea, Agra Univ. J. Res. (Sci.)*, **4** : 747.

This is synonymised to *Indolestes cyaneus* (Selys). Justifying the claim of Tsuda (1991); although Davies and Tobin (1984) accepted *Archibasis sushmaea.* Prasad and Varshney (1995) have also considered the species as synonym of *Indolestes cyaneus.*

Genus ***Pyrrhosoma*** Charpentier

1840. Charpentier, *Agrion (Pyrrhosoma), Lib. Europ.*, p. 19.

1890. Kirby, *Pyrrhosoma, Syn. Cat. Neur. Odon.*, p. 140.

2000. Tsuda, *Pyrrhosoma, A distributional list of World Odonata*, p. 48.

Pyrrhosoma nymphula elisabethae Schmidt

1948. Schmidt, *Pyrrhosoma elisabethae, Opusc. Ent.*, **13** : 69-74.

1954. Buchholtz, *Pyrrhosoma nymphula* race *elisabethae, Bonn. Zool. Beitr. Sonderband*, p. 58.

2000. Tsuda, *Pyrrhosoma nymphula elisabethae, A distributional list of World Odonata*, p. 48.

Remarks : Tsuda (2000) reported *Pyrrhosoma nymphula elisabethae* Schmidt occurring in India, but Kalkman and Lopau (2006) described the diagnostic structural characters of *P. elisabethae* and *P. nymphula* and considered they are two distinct species. *P. elisabethae* is endemic to Europe and *P. nymphula* is also recorded from Greece to Turkey. *It is believe that the species does not occur in India.*

Genus ***Himalagrion*** Fraser

1919. Fraser, *Himalagrion, Rec. Indian Mus.*, **16** : 452-453.

1933. Fraser, *Himalagrion, Fauna Brit. India, Odon.*, **1** : 330-331.

Diagnostic characters : Head narrow, large triangular postocular coloured spots; thorax small and slim; posterior lobe of prothorax rounded, simple; legs medium in length, tibial spines 10 to 12 in the hind tibiae. Wings hyaline, long and narrow; pterostigma is similar in shape in both wings, longer than broad; proximal and distal side oblique, unbraced covering slightly less than one cell; 15-16 postnodals in fore-wings and 14-15 in the hind-wings; discoidal cell acutely pointed at distal end, with costal less than half the length of posterior in fore-wing, rather more than half the length in the hind; basal side equal to costal side in fore-wing, only half the length in the hind, *arc* situated at the level of the distal antenodal nervure; *ab* arising very slightly proximal to the level of *ac*, which lies midway between the two antenodals, complete and continued on as *IA* with the formation of an angulation at the junction of the two, R_{4+5} arising well before the oblique vein descending from the subnode; IR_3 in continuation of that nervure. Abdomen long, cylindrical, anal appendages short, superiors obtuse, irregular, inferiors broad at base, acutely pointed, forcipate.

Remarks : The points of origin of the vein *ab*, shape of anal appendages reveal the closeness of the genus to *Pseudagrion* Selys and *Ceriagrion* Selys. It may be a link population between the two genera, pending further collections the genus is being kept separate from the other two genera.

Type-species : *Himalagrion exclamationis* Fraser.

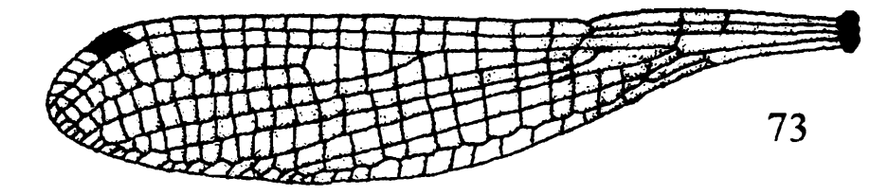
Distribution : Bangladesh, India, Nepal.

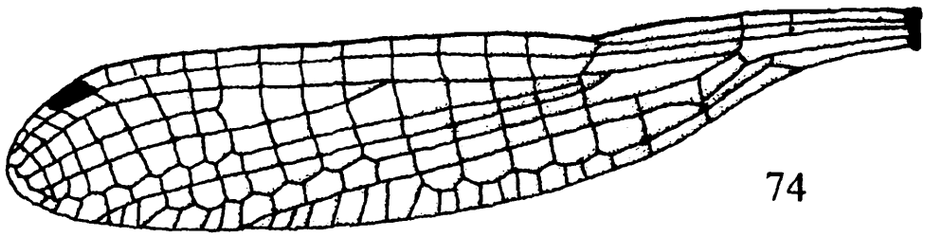
Himalagrion exclamatione Fraser

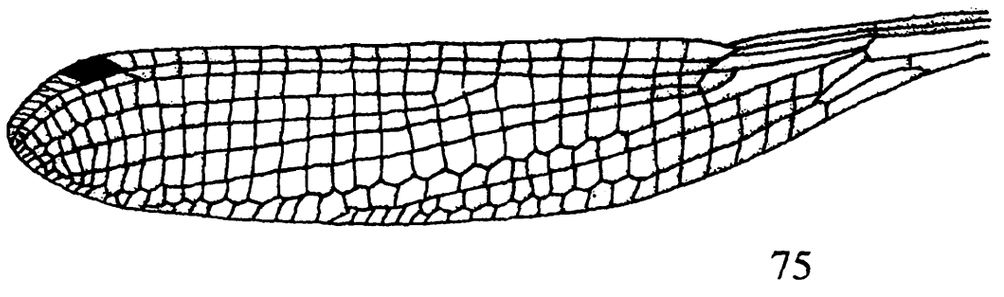
1919. Fraser, *Himalagrion exclamationis, Rec. Indian Mus.*, **16** : 453.

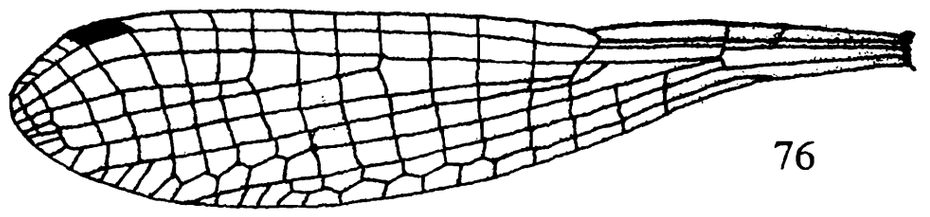
1933. Fraser, *Himalagrion exclamationis, Fauna Brit. India, Odon.*, **1** : 331-333.

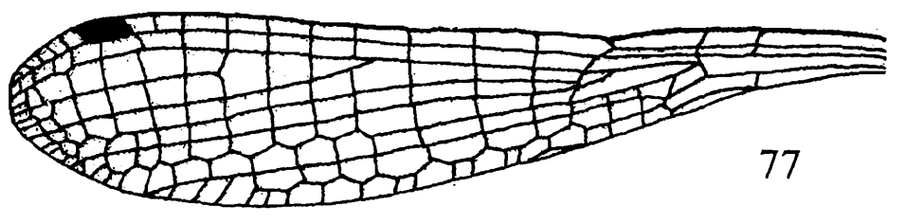
2002. Mitra, *Himalagrion exclamatione, Memoirs zool. Surv. India*, **19** (1) : 151.











Figs. 73-77. 73. Fore-wing of male *Calicnemia miniata* (Selys); 74. Fore-wing of male *Platycnemis dealbata* Selys; 75. Fore-wing of male *Indocnemis orang* Foerster; 76. Fore-wing of male *Copera marginipes* (Rambur); 77. Fore-wing of male *Pseudagrion spencei* Fraser

No specimen could be examined.

Distribution : INDIA : West Bengal: Darjiling (Fraser, 1933 b).

Elsewhere : Bangladesh, Nepal (Tsuda, 2000).

Himalagrion pithoragarhicum Sahni

1964. Sahni, *Himalagrion pithoragarhicum, Agra Univ. J. Res. (Sci.)* **13** : 79.

1995. Prasad and Varshney, *Himalagrion pithoragarhicum, Oriental Insects*, **29** : 389.

2000. Tsuda, *Himalagrion pithoragarhicum, A distributional list of World Odonata,* p. 34.

Sahni (1964) described the species from the Western Himalaya. No specimen of the type material is available, figures not properly drawn and description is confusing. Hence determination of status is not possible. We believe no species of the character described by Sahni (1964 and 1965) exists in India. *The species is non existent form.*

Genus ***Onychargia*** Selys

1865. Selys, *Onychargia, Bull. Acad. Belg.*, (2) **20** : 416.

1933. Fraser, *Onychargia, Fauna Brit. India, Odon.*, **1** : 416-417.

Diagnostic characters : Head narrow, frons rounded and rather prominent, posterior lobe of prothorax in male rounded, but in female middle portion greatly prolonged. Thorax normal size, legs moderately long and robust, hind tibiae with about 9 or 10 long spines, claw hooks at the extreme end, which thus appears bifid. Wings hyaline, pterostigma nearly quadrangular, distal side more oblique than proximal, braced, covering less than one-cell; 10-11 post nodals in fore-wing, 10 in hind-wing; discoidal cell acutely pointed at the distal end; sectors of *arc* arising from the lower end of the *arc,* which is at the level of the distal antenodal nervure, angle at the junction of *IA* and *ab*; *ac* situated towards the proximal antenodal nervure; R_{4+5} arising well before the subnode, while IR_3 arising from the oblique vein descending from the subnode. Abdomen cylindrical, slightly dilated at the base and anal ends; segment 10 deeply emarginated on the middorsum with two tubercles at the apical border. Anal appendages variable in the species, but superiors and inferiors equal in length; segment 8 in the female without a ventral spine.

Type-species: *Onychargia atrocyana* Selys.

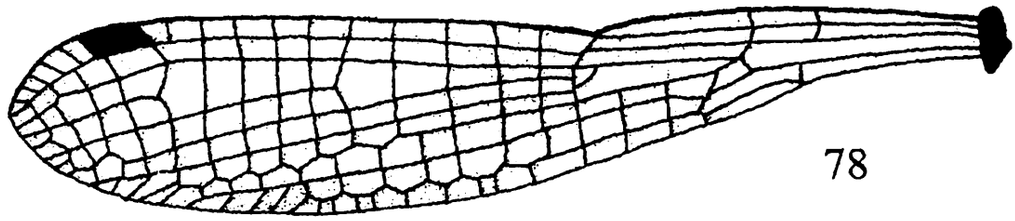
Distribution : Bangladesh, Hong Kong, India, Indonesia, Myanmar, Malaysia, Nepal, Singapore, Sri Lanka, Philippines, Thailand, Taiwan, Vietnam.

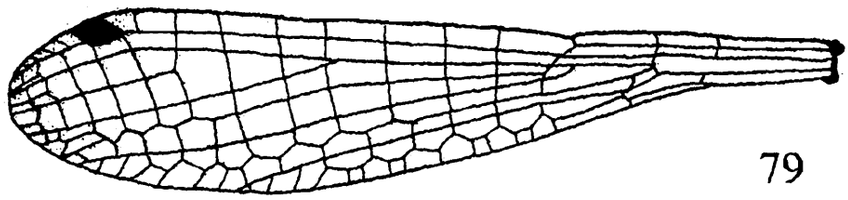
Onychargia atrocyana Selys
(Fig. 71)

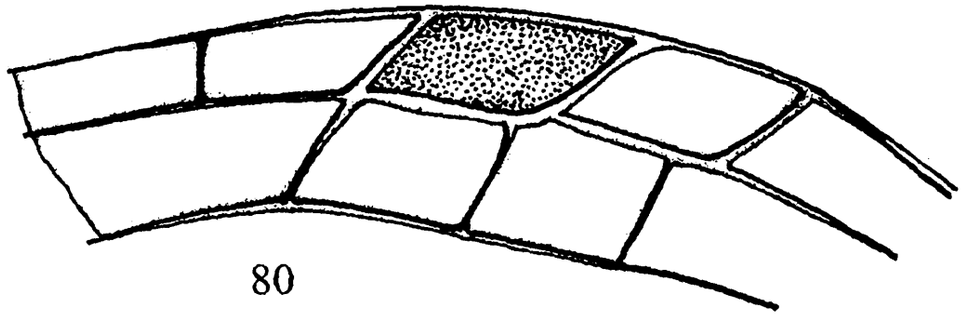
1865. Selys, *Onychargia atrocyana, Bull. Acad. Belg.*, (2) **20** : 416.

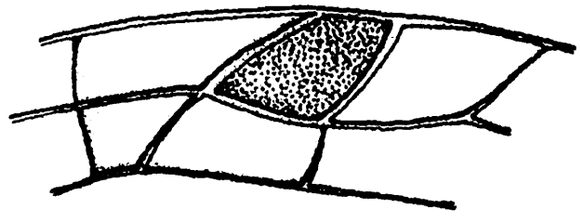
1933. Fraser, *Onychargia atrocyana, Fauna Brit. India, Odon.*, **1** : 417-418.

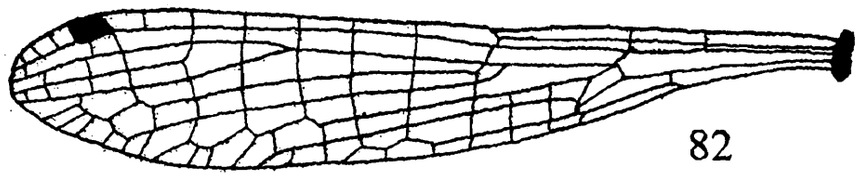
Material examined : Arunachal Pradesh : Namsai, 1 Male, 15.iii.1969; Assam: Goalpara, 1 Male, 2.vi.1973; Manipur: Moirang, 1 Female, 25.v.1974; Orissa: Bolangir,



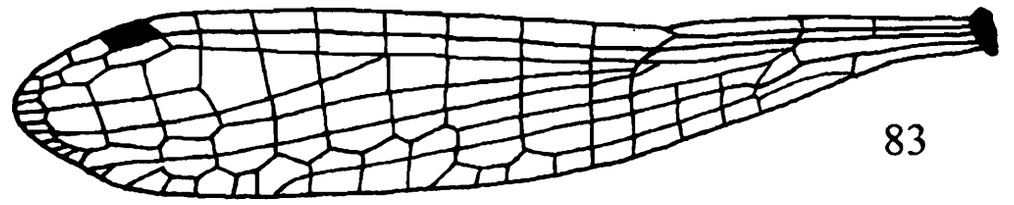


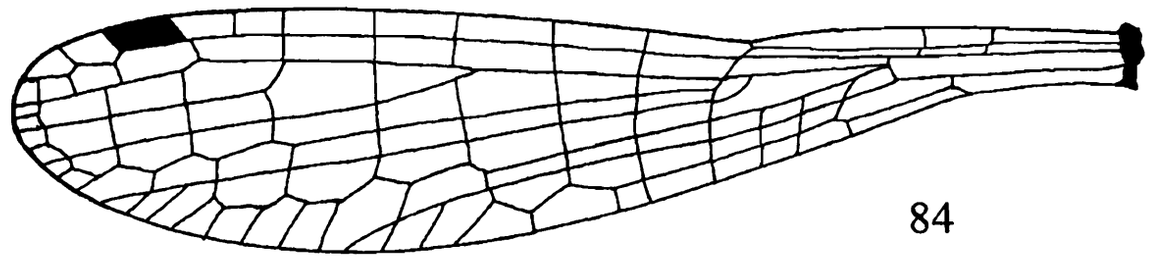


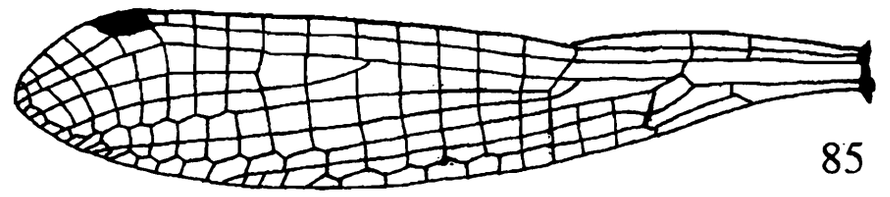


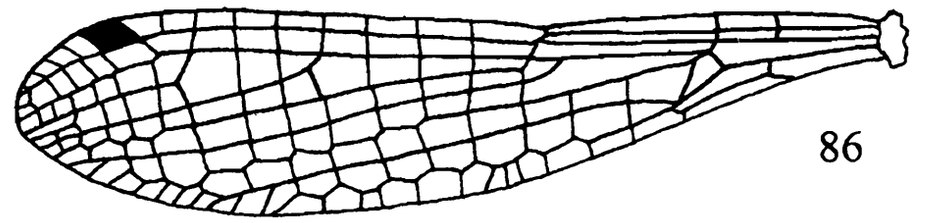


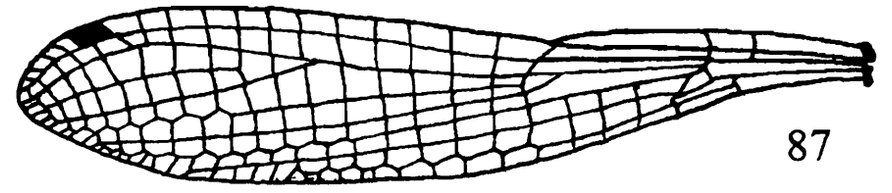
Figs. 78-82. 78. Fore-wing of male *Ceriagrion coromandelianum* (Fabricius); 79. Fore-wing of male *Ischnura senegalensis* (Rambur); 80. Pterostigma of male *Ischnura senegalensis* (Rambur); 81. Pterostigma of male *Ischnura forcipata* Morton; 82. Fore-wing of male *Rhodischnura nursei* (Morton)











Figs. 83-87. 83. Fore-wing of male *Aciagrion hisopa hisopa* (Selys); 84. Fore-wing of male *Agriocnemis pygmaea pygmaea* (Rambur); 85. Fore-wing of male *Argiocnemis rubescens rubeola* Selys; 86. Fore-wing of male *Paracercion calamorum dyeri* (Fraser); 87. Fore-wing of male *Enallagma cyathigerum cyathigerum* Charpentier

1 Male, 9.xi.1972; West Bengal: Calcutta, 1 Female, 28.ix.1966; 1 Male, 24.iii.1967; 1 Male, 2.iv.1967; 1 Male, 19.iv.1967; Nagaland: Dimapur, 2 Female, 17.ix.1994.

Distribution : INDIA : Dejoo, North Lakhimpur, Upper Assam (Laidlaw, 1914); Sibsagar, Assam (Laidlaw, 1919); Coorg (Fraser, 1924 a and 1931); Malabar (Fraser, 1933 b); Bengal (Fraser, 1933 b); Andhra Pradesh, (Prasad, 2007 a); Arunachal Pradesh, Assam (Mitra, 2002 b); Gujarat (Prasad, 2004); Kerala (Emiliyamma *et al.*, 2007); Manipur (Mitra, 2002 b; Srivastava and Sinha, 2004); Nagaland, Orissa (Mitra, 2002 b); Tamil Nadu (Emiliyamma, 2009); West Bengal (Srivastava and Sinha, 1993; Mitra, 2002 b).

Elsewhere : Burma (Myanmar) (Fraser, 1933 b; Lieftinck, 1971); Malaysia (Brooks, 1981); Borneo (Lieftinck, 1971); Ceylon (Sri Lanka) (Fraser, 1933 b; Lieftinck, 1971); Thailand (Kiauta and Kiauta, 1983 b); Bangladesh, Hong Kong, Indonesia, Nepal, Singapore, Vietnam (Tsuda, 1991).

Onychargia sp. indet.
(Fig. 72)

Material examined : Mizoram: Terei, 3 Female, 22.x.1991; 1 Female, 24.x.1991.

These enigmatic specimens have characters of the genus *Onychargia* Selys. But they differ from *Onychargia atrocyana* Selys due to bigger size, more number of postnodals mainly and colour of different body parts. Detail description is provided by Mitra (2002 b). Hence no key could be prepared for *Onychargia* species.

Onychargia indica Sahni

The description and figure is very confusing, no taxonomic status of the species described is determinable. *Hence we believe it does not exist.*

DISCUSSION

It is known that Indian fauna is derived mainly from the Malaysian sub region and to a lesser extent from the Palearctic; but it is rich in endemic forms and three important zoo-centres.

Among Platycnemidids and Coenagrionids of India there are fifteen endemics, *viz.*, *Calicnemia sudhae, Calicnemia mukherjeei, Calicnemia carminea pyrrhosoma, Coeliccia fraseri, Coeliccia prakritiae, Coeliccia schmidti, Coeliccia dorothea, Coeliccia rossi, Coeliccia sarbottama, Aciagrion approximans, Agriocnemis pieris, Ceriagrion rubiae, Mortonagrion varalli, Pseudagrion? andamanicum, Pseudagrion indicum.* Of these eight Platycnemidids are concentrated in the North- East India and *Calicnemia carminea pyrrhosoma* occurs in Dehra Dun, Western Himalaya. Coenagrionids *Aciagrion approximans* and *Agriocnemis pieris* occurs in different parts of India, *Mortonagrion varalli* and *Pseudagrion indicum* occurs in the Western Ghats. *Pseudagrion? andamanicum* occurs in Andaman and Nicobar Islands. *Ceriagrion rubiae* occurs in Orissa and Western Ghats.

From the above it appears that North-East India is the important zoo-centre for Platycnemidids of India. It is fact that North-East India supports dense vegetation, and is sequester into several pockets by hills, fast flowing streams and rivers. Moreover no species is migratory. Hence low migration pressure, ecological diversification brought less competion among these Odonates and helped in the local evolution of different taxa (Mitra, 1999 and 2002 b). The Western Ghats contain endemics in other families of Odonata, including *Mortonagrion varalli* and *Pseudagrion indicum* in the present discussion. It is because isolation of Western Ghats from other zoo-centres.

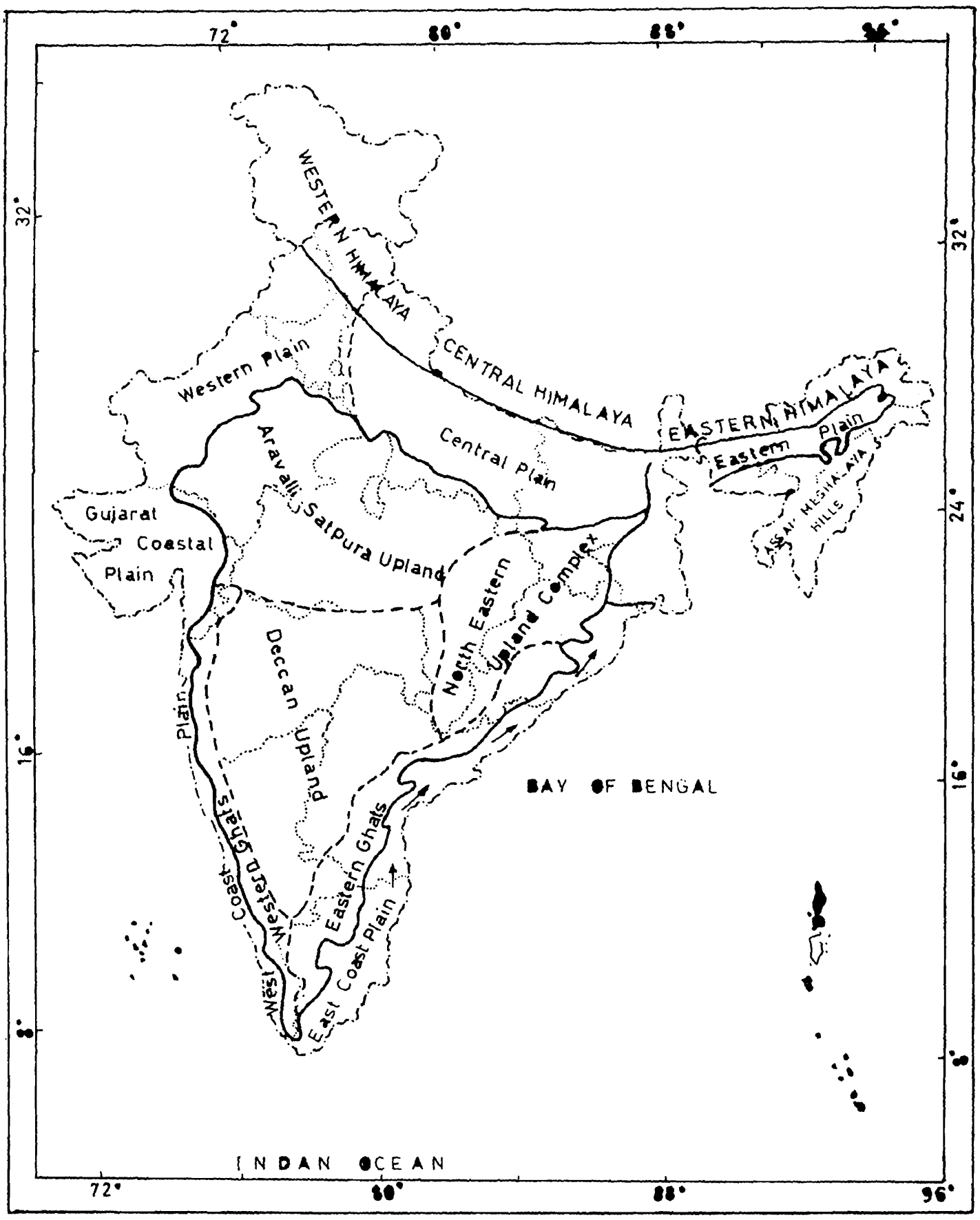
Faunal relationship :

Common to Indo-Chinese subregion	:	31 species
Common to Chinese region	:	19 species
Common to Malaysian region	:	18 species
Common to Pakistan and other desert region	:	14 species

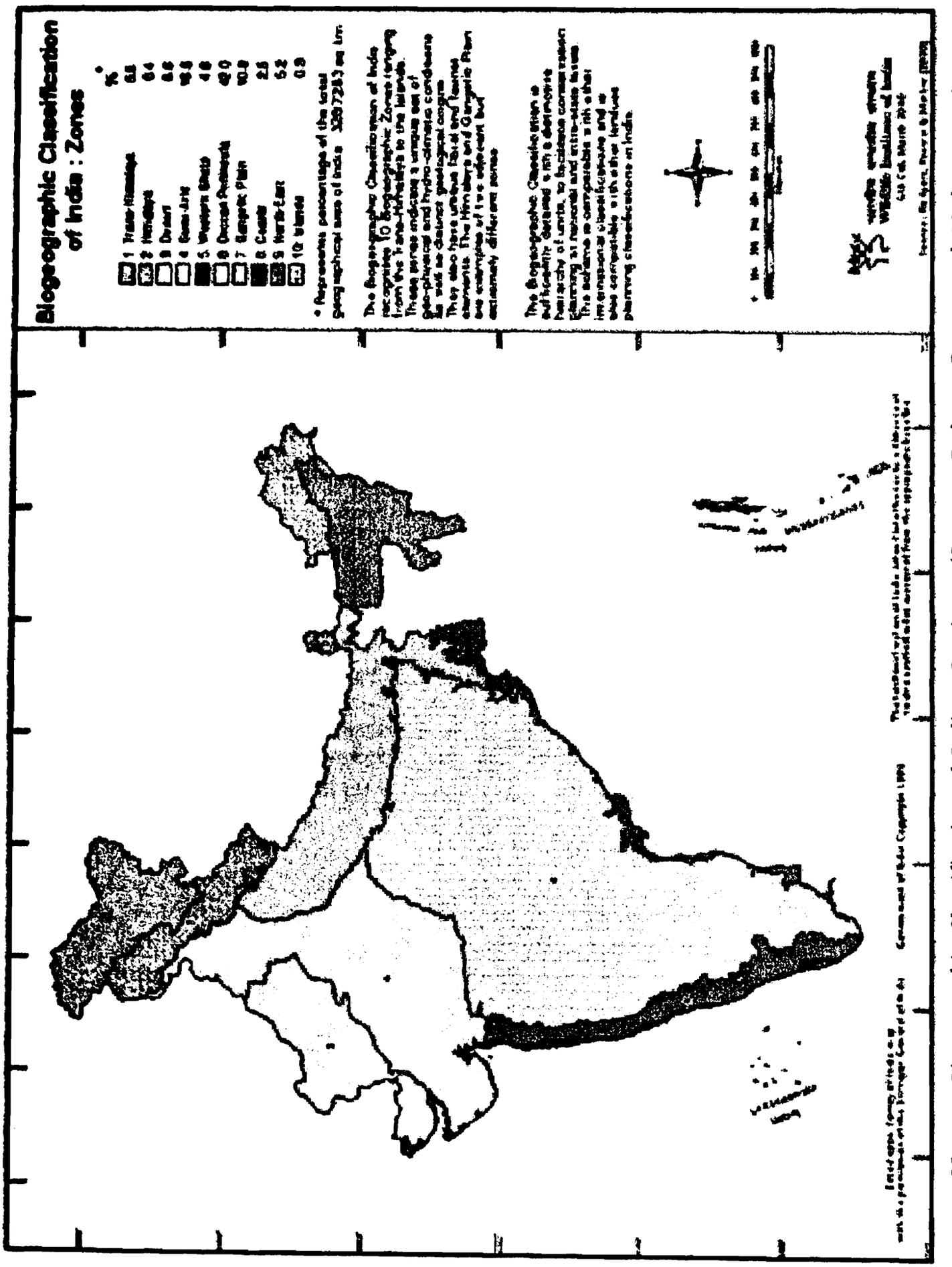
Distribution pattern : There are both continuously distributed and discontinuously distributed species. One group of the continuously distributed species occurs from India to Malaysian region; the other group of species is distributed from India to Chinese region; the third group of species ranges from the Western India to Pakistan and Central Asian desert region. Therfore, the influx of population as well as genetic combination took place in two directions- Eastern border line and Western border line.

Eastern border line : In case of Odonata the area is transitional and represents a gate of faunal exchange as well as important centre of differentiation and radiation as well. The area appears to be important meeting point of the humid tropical tertiary mountain faunas and Gondwana fauna. Through this gate almost uninterrupted interchange took place between different parts of Eastern India as well as Indian peninsula and Asia. The exchange mainly involved transgression of the Indo-Chinese-Malayan fauna into Indian mainland. This has been taken place along two lines- Primarily westwards along the Himalayas and southwards to the Peninsula. The Asiatic fauna has spread in the direction of the west both to the North and South of the eastern end of the Himalayas. In the North of Himalayas, these fauna have transgressed not only in the eastern Tibet but also in the mountain ranges of the Himalayas in confluence with the Indian side. Indo-Chinese and Malaysian forms extended further west and are indeed represented by a series of local endemics along the Himalayas. Lieftinck (1984) opined that *Calicnemia* species have radiated from the Himalayas; on the other hand Kiauta (1984) considered Chlorocyphids reached India from South-East Asia. These can be taken as example.

Western border line : The ecological and biogeographical transitional area lying between the plains of river Indus and the Iranian-Afghanistan border constitutes the



Map 1. Physiography of India



Map 2. Biogeographic Classification of India : Provinces (Source : Rodgers, Panwar and Mathur, 2000)

Western border lands of Indian Zoogeography. The characteristic fauna in the area is composed largely of Mediterranean elements with a considerable admixture of Turkmenian and some Ethiopian derivatives of the dragonflies of India. An influx through the western gate had occurred in India probably after the Pleistocene since this region came in contact with the peninsula much later; in the west the transgression fauna to the Indo-Ganga plain has taken place *via* the peninsula. Distribution of fauna from the eastern India to the peninsula or vice-versa has taken after the formation of the Ganga plain. The Satpura Hypothesis does not hold good in this case. It is conjectured that species of *Ischnura* and *Pseudagrion* have invaded India through the Western Gate.

SUMMARY

The monograph deals with detailed geographical distribution in the World of each species with records of authorities. It also discusses the relationship between *Ischnura* and *Rhodischnura; Agriocnemis* and *Mortonagrion*. It comments on taxonomic status and distribution of species of *Paracercion, Enallagma* and *Pyrrhosoma*; *Agriocnemis corbeti* Kumar and Prasad, *Agriocnemis keralensis* Peter, *Calicnemia mahesi* Sahni, *Coenagrion kashmirensis* Das, *Archibasis sushmaea* Baijal, *Onychargia indica* Sahni, *Enallagma insulae* Fraser, *Calicnemia miniata doonensis* Sangal and Tyagi; comments on the new combination of *Mortonagrion aborense* (Laidlaw); finally comments on the taxonomic status of several taxa appeared in the recent literature.

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